

CORN AND HOG SURPLUS
OF THE CORN BELT

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CORN AND HOG SURPLUS OF THE CORN BELT

By

ALONZO E. TAYLOR

Director, Food Research Institute

FOOD RESEARCH INSTITUTE
STANFORD UNIVERSITY, CALIFORNIA

THE FOOD RESEARCH INSTITUTE

was established at Stanford University, California, in 1921, jointly by the Carnegie Corporation of New York and the Trustees of the Leland Stanford Junior University, for research in the production, distribution, and consumption of food.

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PREFACE

Before the World War few students of American agriculture foresaw the day when agriculture would plead for parity with industry in this country. The day has arrived, and leaders of agriculture have sensed a fundamental change. Not long since, Henry C. Taylor, in addressing the American Farm Economic Association, invoked a national policy of guidance for the farm-to-town movement. That fourth of the total population engaged in agriculture finds the occupation unsatisfying. The transition from the predominatingly agrarian state to the predominatingly industrial state was favored by technological developments, expansion of mass production in industry, mechanization of agriculture, decline in the rate of growth of population, and decline in per capita consumption of food. The World War accelerated and intensified the change and effected untoward dislocations. Huge increases in internal and external national debts and shifts in creditor and debtor positions influence international trade. Improvements in transportation, communication, and credit have unified the markets of the world, with intensification of competition. In consequence of the accelerated developments of the past fifteen years, we face new problems of agriculture in advance of their times.

The corn belt is a large central area with a highly developed agriculture. It exhibits in some respects the most distinctively American farming. It was not developed on Colonial traditions or royal grants of land; it was developed largely by frontiersmen and European immigrants on homesteads. The corn belt is scarcely more than a half-century old. No agrarian question is so typically American as the crop problem of the corn belt.

Within two decades the American corn belt has suffered a war-time expansion, a post-war boom, a post-boom deflation, and a trade cycle of unusual magnitude. Do-

mestic and international factors are mingled. Some of the domestic factors are agricultural; others derive from political, monetary, and industrial influences. Quite certainly both cyclical and secular influences have been at work. Unemployment in agriculture is as complex a problem as unemployment in industry. The declines in the price level and in land values are quite as conspicuous in the corn belt as anywhere.

Risk is perhaps the largest single factor in the profit economy. Subsistence agriculture secures a minimum of profit with a minimum of risk; cash-crop agriculture seeks a maximum of profit, but with a maximum of risk. In trying to combine the two, it has perhaps been unconsciously implied that a maximum of profit may be secured with a minimum of risk.

A shift is under way in this country in the relations of supply and demand. Using the term consumption in the broad sense (to include utilization and disappearance), we find on analysis that per capita consumption of ingestible agricultural products is declining. The implications of this trend become apparent when consumption is separated into its natural subdivisions—waste after harvest; ingestion by human beings; intake by work animals; intake by breeding stock; and intake by animals for production of edible food products. These are all declining. Waste after harvest is being reduced by improvements in harvesting, storage, grading, transportation, and distribution. Ingestion of foodstuffs by human beings is declining because manual work is being supplanted by machines. Food claims a declining share of the national income, whereas comforts, conveniences, and luxuries claim an expanding proportion. The feed requirements of the population of work animals are being reduced by decline in numbers. The feed requirements of the breeding stock of the national animal husbandry are being reduced by selection, increasing fecundity, prevention of diseases,

and care of young animals. The feed requirements of animals being used for production of marketable food products are being reduced by selection and application of efficient methods of feeding. Cumulatively, therefore, the per capita consumption of the population will decline year after year, perhaps for a couple of decades. The rate of growth of outturn of agricultural products is increasing per unit of area and much more per man. The rate of growth of population is lower. For the world as a whole, the rate of increase of outturn of foodstuffs has been certainly more than 2 per cent per annum, while rate of increase of population is scarcely more than 1 per cent per annum. In the United States the disparity is much greater. This implies that the gross requirement for ingestible American agricultural products will probably be no larger in this country in 1940 (or perhaps even in 1950) than in 1930. This limitation of the domestic market presses on the agriculture of all regions, but to a disproportionate extent probably on the corn belt, on account of the preponderance of staples over specialties in the agriculture of this area. The outlook for the next decade depends on the trend of production, the trend of consumption, the trend of substitution, and the trend of the price level, at home and abroad.

Beginning with the Joint Committee of Agricultural Inquiry in 1921, Congressional hearings and investigations have been more or less continuously occupied with the subject of farm relief. The testimony presented before Congressional hearings has frequently been improperly prepared; the statistical data have generally been poorly compiled and used without discrimination; a great deal of hearsay has been offered; and special pleading has abounded. And yet it is necessary to go through these pages if one wishes to distinguish between political and technical appraisal of farm distress and farm relief.

Those desirous of obtaining a comprehensive back-

ground of the post-war agricultural situation in the United States will find it advantageous to read, preferably in the order of their appearance, a half-dozen volumes on the subject. These are:

"The Agricultural Situation in the United States," *The Annals of the American Academy of Political and Social Science*, January 1925, CXVII.

The Agricultural Problem in the United States. (National Industrial Conference Board, Inc. New York, 1926.)

The Condition of Agriculture in the United States and Measures for Its Improvement: A Report by the Business Men's Commission on Agriculture. (Published jointly by the National Industrial Conference Board, Inc., of New York City, and the Chamber of Commerce of the United States of America, Washington, D.C., 1927.)

"Farm Relief," *The Annals of the American Academy of Political and Social Science*, March 1929, CXLII.

The Economics of Farm Relief: A Survey of the Agricultural Problem, by Edwin R. A. Seligman. (New York, Columbia University Press, 1929.)

Agricultural Reform in the United States, by John D. Black. (New York, McGraw-Hill Book Company, Inc., 1929.)

Numerous other works have appeared, of which one particularly is to be recommended—the chapter on agriculture by E. G. Nourse, in *Recent Economic Changes in the United States* (report of the Committee on Recent Economic Changes of the President's Conference on Unemployment, published for the National Bureau of Economic Research by the McGraw-Hill Book Company, New York, 1929, II, 547–602). Reviews on recent books on the agricultural situation, by J. S. Davis, are to be found in the *Quarterly Journal of Economics* for May and for November 1929. The *Journal of Farm Economics* contains many

articles dealing with the general problem and with special questions.

An excellent examination of the agricultural problem in Germany, the largest net importing country, is to be found in a recent technical collaboration, issued by Max Sering, "Die Deutsche Landwirtschaft unter volks—und weltwirtschaftlichen Gesichtspunkten," *Berichte über Landwirtschaft* (Berlin, Paul Parey, 1932), Neue Folge, 50, Sonderheft.

The problem of the corn belt contains elements of agriculture, physiology, chemistry, and economics, of which the interrelations are complex. To undertake a systematic analysis implies a competence in four fields which I do not possess. But since the approach is clearly indicated, I have ventured to make the trial. Some of the conclusions are inductions, others are more or less conjectural inferences. To a large extent the treatment consists in technical interpretation rather than in close demonstration. Realism is demanded. The treatise was not written to depict the immediate future on the basis of the immediate past. Broad historic trends and long-term technical developments justify the use of prophecy, and I have not hesitated to take the risk of forecasting. The argument includes prognostications which will be fulfilled or refuted within a decade. Every effort has been made to secure accuracy in data and technical description, but I feel that such inaccuracies as exist do not affect the argument.

It is possible that agriculturists will feel that I have extolled too highly the importance for animal husbandry of knowledge of the physiology of nutrition. It is possible that farmers will feel that I have emphasized too much the substitutability of vegetable fats and oils for animal fats and oils. It is possible that agricultural economists will feel that I have overstressed the effect of limitation of food and feed requirements on the demand for farm

products. I have sought to present a balanced consideration, because the inductive method is sound even if the treatment is faulty.

I have sought advice, information, and correction in many quarters, and the list of those to whom I am thus indebted is too long for individual acknowledgment. The Departments of Agriculture and of Commerce in Washington have been very helpful in providing statistical data. My colleagues in the Food Research Institute have read parts of the manuscript but carry no responsibility for the work. To my secretary, Elizabeth Brand Taylor, I am under deep obligation for indefatigable assistance in the preparation of the manuscript.

ALONZO E. TAYLOR

STANFORD UNIVERSITY, CALIFORNIA
December 30, 1931

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CORN AND HOG SURPLUS
OF THE CORN BELT

CHAPTER I

INTRODUCTION

Influence of historical policies—Effects of the World War—Trends in the background and foreground of the discussion: Trend in the price level; Trend in the international trade account; Trend in extensive agriculture; Trend in the mechanization of agriculture; Trend in competition between animal and vegetable fats and oils; Trend in the scale of living; Trend in per capita food requirement; Trend in the rate of growth of population; Application of the trends to the corn belt—Social and political considerations—Concluding observations

Corn (*Zea mays*, Indian corn, maize) is raised in every state in the United States, but the intensive production is practiced in greatest concentration in the corn belt. This is a region extending westward from mid-Ohio to mid-Nebraska, to the northward including southern Michigan, southern Wisconsin, southern Minnesota, and southeastern South Dakota, to the southward including northern Missouri and eastern Kansas. The boundaries of the corn belt are not fixed by soil or climate, but have shifted with changes in population, improved strains and earlier maturity of corn, and collateral developments in agriculture; the belt at present includes more of Minnesota, South Dakota, and Nebraska than was the case ten years ago, also a part of Oklahoma. In an area including the nine states of Ohio, Indiana, Illinois, Minnesota, Iowa, Missouri, South Dakota, Nebraska, and Kansas, is raised 60-70 per cent of the corn crop. Corn is raised in the corn belt chiefly to be fed to animals, especially hogs. Though the agriculture of that region is well diversified, the crop rotations and diversifications are mostly co-ordinated with the production of corn and hogs. Corn is a prominent cereal foodstuff in the United States, contributing somewhat less than 7 per cent of the calories of the national diet.

There is swine husbandry in every state, but it is prac-

ticed most intensively in the corn belt. Some two-thirds of the hogs of the country are found in the nine corn-belt states. This is the region of the country from which are obtained the major supply for the urban population outside the region and the bulk of our exported pork products. In this area lie eight of the ten principal markets for corn, seven of the nine principal stockyard markets, all of the first-size packing houses, and the majority of the second-size packing houses of the country. Hog products contribute close to 15 per cent of the calories of the national diet.

Under the influence of a liberal land policy, the corn belt was settled rapidly after the Civil War. The raising of cattle and hogs expanded likewise. What appears to have been the crest of the development was attained during the first decade of this century. Rapid rate of growth of population and improvement in the scale of living supervened. In the five years before the World War the prices of corn, cattle, and hogs reached the highest level they had attained. Exports of cattle products practically ceased; exports of corn and hog products declined. Land values had risen progressively but not exorbitantly, mortgage debt was moderate, rates of interest not extortionate, and taxation not pressing. During the half-century between the American Civil War and the World War, the purchasing power of corn and hogs in the corn belt rose continuously, though irregularly (with a few recessions due to large crops), especially during the last two decades of the period. In fact, just before the World War the conditions in the corn belt might have been reasonably described as "stabilized prosperity."

INFLUENCE OF HISTORICAL POLICIES

Several historical policies of the country have been factors in the present situation of agriculture in the corn belt. One of these was the homestead policy, the settle-

ment west of the Allegheny Mountains, and especially west of the Mississippi, on next-to-free land. This represented a promotion of the Middle West and a subsidy to agriculture, and stimulated expansion in advance of commercial considerations. Free entry of immigrants, with the national policy favoring immigration, provided both settlers and laborers for the expanding agriculture. Since the settler made only a nominal investment in land, prospective rising land value held out the promise of large investment profit. With prospect of large investment profit, the farmer was content to work for low operative profit. The national policy in respect to foreign borrowings and domestic railway development favored extractive agriculture. It was assumed or implied that the well-being of agriculture was synonymous with the expansion of agriculture. Demand was taken as assured.¹ When, suddenly, after the World War the trend of rising land values was checked, agriculture over large areas found itself, in effect, deprived of investment profit and reduced to operative profit.

Over the same interval since the Civil War the inventive talent of the country has been engaged in the utilization of our exceptional natural resources. Gradually were evolved the techniques of mass production and rationalization of manufacture, greatly favored by growth of population and developments in transportation, communication, and credit. These advancements were accelerated and enhanced first by the protective tariff and subsequently by restriction of immigration. Finally, also, in consequence of the World War, American manufacturers obtained exceptional opportunities in world markets. Out of this combination of circumstances has evolved in

¹ In the dialogue between David Ricardo and Young Economist, Ricardo is made to say: "I agreed with J. B. Say that demand can be taken for granted and production creates its own market."—James Bonar, *The Tables Turned* (London, Macmillan, 1931), p. 75.

urban industry the correlation of high wage scale and low labor cost. In this manner were attained high urban income and a rapidly expanded scale of living.

The past and current agricultural philosophy of the corn belt may be stated in the words of H. A. Wallace and E. N. Bressman¹ as follows:

Under ordinary conditions, corn derives its value largely from its ability to furnish fat-forming material to hogs more cheaply than any other grain. By means of the corn-hog combination, it is possible to produce palatable meat with a less expenditure of land and human labor than in any other way. Corn is the most efficient plant of the temperate zones in fixing the energy of the sun's rays, and the hog is the most efficient meat animal for converting that sun energy of corn into a palatable form for human consumption. Corn also derives a part of its value from its ability to furnish the 22,000,000 farm work horses and mules of the United States the cheapest energy which can be obtained in any grain.

Heretofore, corn has derived only a small part of its value from its use in factories and mills. Its use in this way is steadily growing, however, and eventually the corn food products as manufactured will have as much to do with corn values as the ham, bacon and lard which are made by the hog out of corn.

It is our purpose in this book, among other things, to indicate that changed circumstances in the country and in the world are making this agricultural philosophy untenable. It is becoming necessary to segregate protein from fat in the products of animal husbandry. It is no longer possible to produce palatable animal fat by means of the "corn-hog combination" with less expenditure of land and human labor than in any other way. The vegetable oils have entered into the picture. We recognize that corn is the most efficient plant in the Temperate Zone in fixing the energy of the sun's rays and that the hog is the most efficient animal for converting the sun-energy of

¹ *Corn and Corn Growing* (New York, John Wiley & Sons, Inc., 1928), 3d ed., p. 297.

corn into fat; but these circumstances lose much of their importance when we recall that the tropical sun produces fats and oils directly at a lower cost than the sun in the Temperate Zone and that a one-stage production of fats and oils from sunshine is inherently cheaper than a two-stage production involving domesticated animals. The utility of corn as feedstuff for work animals loses its force as work animals are replaced by gas engines. Finally, the industrial utilization of the corn plant is not proceeding rapidly enough to make good the declines in the use of corn as foodstuff, directly or indirectly, and as feedstuff. In short, the corn belt stands under the necessity of modifying a time-honored agricultural philosophy to a far-reaching extent.

EFFECTS OF THE WORLD WAR

Wars are the curse of agriculture. Wars create an artificial price level, bring about a spurious prosperity, lead to premature tillage of good land and uneconomic tillage of poor land, stimulate investment and promote debt in inflated currency, and obscure the enduring relationship between cost and price. When the war is over, the price level collapses and deflation replaces inflation, leaving farmers marooned with heavy investments and high costs, with liquidation the only escape for many. The losses of war must be paid off sooner or later, and farmers pay a disproportionate share.

The World War entailed a heavy export demand for cattle and hog products. To provide feed for the animals, the corn acreage was extended. In the corn belt the acreages of wheat and corn were expanded—by introduction of new land, by breaking grass land, and by contracting acreage of other crops. Farm prices of corn and hogs were high. With large outturn and high prices, farmers felt themselves exceptionally prosperous. Despite the ephemeral nature of war prices (and prosperity), land

values rose rapidly. Since public improvements were held in check, taxes did not rise significantly. So long as the war continued, agricultural income in the corn belt was not significantly dissipated and resources were conserved, except for purchase of land.

After the close of the war followed a short period of indecision and hesitation. This was due, in the corn belt especially, to distrust of the market outlet for the oncoming pork products, planned as supply for the allied countries for the expected prolongation of the war during 1919. Through the energetic offices of the United States Food Administration and the American Relief Administration, a continuation of heavy export of hog products during 1919 and 1920 was provided for.¹ Prices remained high during 1919 and well through 1920. Simultaneously, inflation appeared in factory and on farm. Land values mounted precipitously in the corn belt, with encouragement of local banks. Merchants extended credit freely. Long-deferred public improvements were rapidly authorized and the tax levies rose—high tax rates on heavy assessments. Farmers ceased to conserve their resources: some bought more land, new mortgages were contracted, and many invested their profits in outside speculative ventures. Official warnings from Washington went unheeded. A friendly admonition issued by Henry C. Wallace,² one of the most revered of farm leaders in the Middle West, fell on deaf ears. High prices for corn and hogs found full expression in high prices for land, and agriculture in the corn belt was thought to have entered on a new era of prices and returns.

When the post-boom deflation of prices was complete, in 1921-22, the farmers of the corn belt found themselves with extended acreage, large numbers of hogs and of

¹ Cf. F. M. Surface, *American Pork Production in the World War* (Chicago, A. W. Shaw Company, 1926).

² Cf. *Wallaces' Farmer*, January 30, 1920, p. 338.

cattle as well, high costs and taxes, heavy mortgages and interest charges, and rapidly declining land values. Bank failures abounded, and the remaining banks became as unresponsive to credit appeals as they were previously accommodating. The War Finance Corporation extended some aid to farmers in the corn belt, but many farmers as well as feeders went into bankruptcy. With declining land values, farm sales were repudiated and land passed back from buyer to seller, often to the original owner. When this decline in land values was completed, in its major movement, the level corresponded about to that of 1916.

For the first time in our history, the Corn Belt has become a cause for anxiety. This has happened because corn and hogs, which are the basis of the economy of this region, have lost in relative purchasing power since 1921. From 1900 to 1919 the prices of these products rose more than those of any other major group of farm products; in fact nearly twice as much as the price of wheat and rye. In consequence, production expanded continuously until it reached a high level in 1919 and 1920. For various reasons, among them expanded production in Europe, prices of corn and hogs have been relatively low since the depression.¹

To the farmers in the corn belt, perhaps the most impressive circumstances at the time were collapse of prices and persistence of supplies, in the face of disorganized agriculture and evident hunger in Europe. The situation was first regarded as an emergency; the earliest proposals for "farm relief" were designated as "emergency relief." At this time first appeared the term "surplus" as a significant word in the vernacular of the farmer. Surplus—with demoralized European market, disorganized currencies, and deteriorated purchasing power. "Farm relief" became "surplus control." Even when the European cur-

¹ J. D. Black, *Agricultural Reform in the United States* (New York, McGraw-Hill, 1929), p. 386.

rencies became stabilized, farm relief remained surplus control.

Agricultural distress was world-wide following deflation in 1921-22. Failure of subsequent recovery of agricultural prosperity has been world-wide. Indeed, it may fairly be suggested that the remuneration of agriculture in the United States at the present time stands relatively higher than in many other countries. At the International Economic Conference in 1927, quite as much attention was given to distress in agriculture as in urban industry and commerce.¹ The perfection of practices in commerce and finance in the world has more than ever made the countries of the world kin. Producers of raw materials the world over have passed through a crisis, and no country should be shortsighted enough to view its problems through an inverted telescope. The price deflation that occurred after the war was variously attributed to over-extension of agriculture outside of Europe, withdrawal of international credits, reduction of European purchasing power, collapse of speculative enterprises, and reversal of monetary policy in the direction of resumption of the gold standard. In this country, a widespread opinion in rural circles then sought to lay the blame of deflation on the Federal Reserve System. This is not the place to appraise the post-war deflation of prices; but it is important to bear in mind that the deflation was world-wide, and in every country the producer classes have sought to place

¹ Cf. J. Gautier, A. Hermes, and H. A. F. Lindsay, *Agriculture and the International Economic Crisis*, Documentation of the International Economic Conference, Publications of the League of Nations, Economic and Financial Section (Geneva, 1927). The League of Nations is issuing two new volumes of reports on the agricultural crisis, one of which appeared on June 15, 1931. A highly significant discussion of the international problem is to be found in A. Loveday, *Britain and World Trade* (London, Longmans Green & Company, 1931). It is interesting to recall in 1931 that in 1845, in a speech before Parliament, Cobden declared (without contradiction) that half of the farmers of England were insolvent and the other half were paying their rents out of their capital.

the responsibility on internal as well as on external factors.

Finally, there has occurred the further decline in price level of cereal and animal crops in the corn belt, in connection with the business depression which began in the fall of 1929. It is true that the prices of corn and hogs have not suffered as heavily as have the prices of some other crops. The short corn crop of 1930 had some influence in retarding the decline in price of corn which has become conspicuous with the harvesting of the crop of 1931. The prices of corn and hogs are not now singled out in the corn belt; the prices of practically all major farm products stand strikingly low, in many cases as low as, or lower than, during the 'nineties. From all countries come the reports of agrarian distress centered in a price disequilibrium, a distortion of the relation of gross income to costs and burdens to such an extent as to threaten the continuity of individual enterprises.

TRENDS IN THE BACKGROUND AND FOREGROUND OF THE DISCUSSION

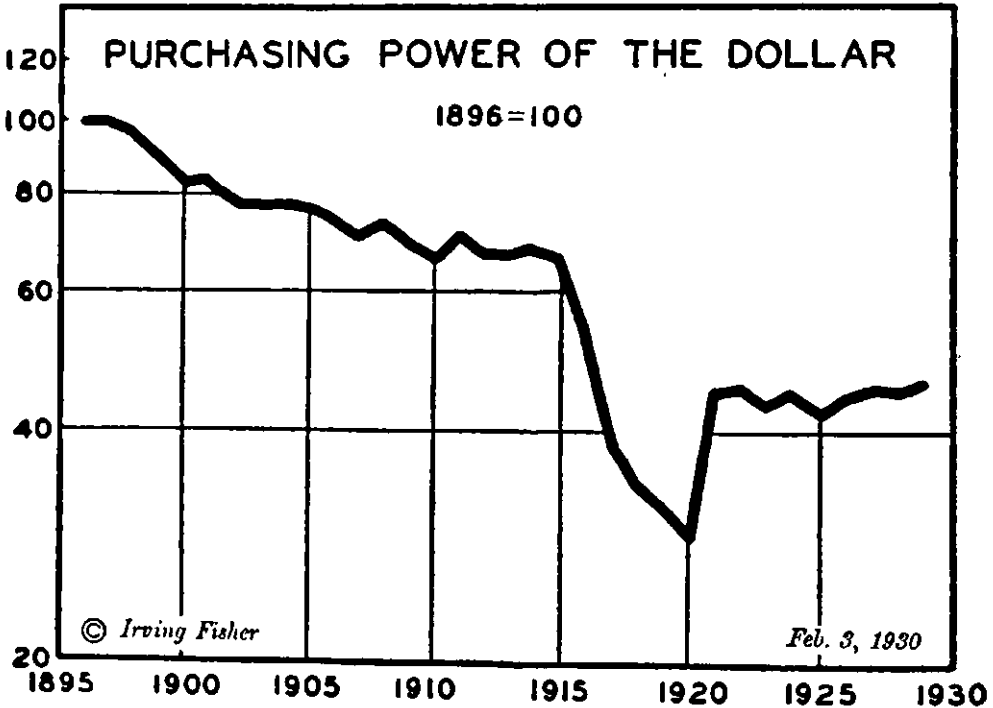
Recognizing that the present situation in the corn belt has had local, national, and international causes, also local, national, and international effects, we must keep in mind that future developments in the corn belt will exert both national and international influences and will be influenced by national and international developments. When one appraises the economic, social, and agricultural situation in the corn belt, the background is to be considered; also the foreground. Indeed, the immediate future appears almost as clear as the immediate past. This foreground, which must be construed with the background in the evaluation of the agricultural situation of the present, consists in trends. These trends are of broad import, but are usually not measurable. We use the word

“trend” not in a statistical sense but according to vernacular usage.

THE TREND IN THE PRICE LEVEL

For reasons that need not be considered here, the purchasing power of the gold dollar reached a high point in the 'nineties, that is, the price level reached a low point. From that time on, the wholesale purchasing power of the dollar declined, with interruptions, until the outbreak of the World War. This trend and the subsequent events are roughly shown in Chart 1, reproduced from Irving Fisher.

CHART 1.—PURCHASING POWER OF THE DOLLAR, 1896–1929*



* Reproduced with the permission of Professor Irving Fisher.

As this chart reveals, American farmers enjoyed a rising trend of prices for two decades before the out-

break of the war. In general, the same situation held for agricultural producers elsewhere in the world. It is noteworthy that this trend was maintained despite expansion in use of oil seeds throughout the world; also despite technical improvements in production. Whether this trend would have continued had the World War not intervened is of course conjectural; but it seems unlikely that the price level of agricultural products would have long continued to rise. Mechanization of agriculture, together with improvements in transportation, communications, and finance, was already operating to bring new land areas into extensive agriculture and to reduce costs. The consequent expansions would probably have checked the trend of rising price level of agricultural products by the end of the second decade of the century. To some extent the war may have accelerated these developments, but on the whole it possibly retarded them.

One of the particular aspects of the price movement since the war has been the behavior of prices of raw materials. In the world-wide deflation of prices in 1920-22, the raw materials (whether of soil or subsoil extraction) suffered exceptionally heavy reductions. With some exceptions, which tend to prove the rule, the prices of raw materials have, since 1925, tended to remain relatively low. Many have indeed declined further and profoundly. To this relative disadvantage in position of the raw materials less attention has been given in this country than abroad; just now, the question of the low prices of raw materials is a burning issue in foreign lands. There is a large body of opinion abroad that the wholesale price level is destined further to decline as expression of declining volume in outturn of new gold. When the annual increment in new gold in the world is less than the annual growth of production and trade under a *laissez faire* policy (a continuation of traditional gold-standard monetary policy), the purchasing power of gold tends to rise and

the price level to fall. For technical reasons, the (predicated) increasing purchasing power of gold may be expected to display its full expression with raw materials, i.e., the price level of raw materials may be expected to persist in a relatively low position. Since the agricultural staples, particularly the cereals, are durable raw materials, lending themselves readily to storage and transportation, and are transferred through the channels of commerce largely on the basis of warehouse receipts, futures contracts, and bills of exchange, it is to be expected that they will exhibit the price reactions characteristic of raw materials. The animal products, despite their perishability, tend in their price reactions to reflect the relations of the raw materials on which the animals are maintained. Broadly considered, therefore, there seems ground for apprehension that producers of agricultural staples the world over face a continuation of relatively low prices, in the event of further decline in outturn of new gold without developments of economies in monetary use of gold. The exaggerated declines in prices of many raw materials during 1930-31 have only served to intensify the apprehension and obscure the prospects.

THE TREND IN THE INTERNATIONAL TRADE ACCOUNT

Before the World War the United States was a debtor nation, the outstanding debtor country. Now the United States is a creditor country. The international trade of each country contains a large number of visible and invisible items, and the latter are of increasing importance. A debtor country has obligations in respect of stabilization of currency and exchange that do not bear on a creditor country. Before the war we exported wheat, cotton, corn, and hog products to pay interest on debts; we have now no such obligation. Canada, Argentina, and Australia must export agricultural staples to pay interest on debts. Before the war our debtor position facilitated

exports; at present our creditor position does not facilitate exports. In view of the complexities of international commerce, the effect upon our foreign trade of the shift from debtor position to creditor position ought not to be exaggerated; but it ought not to be ignored. Before the war, in effect, we tendered agricultural staples to our creditors abroad in liquidation of our debts; now we must sell these staples abroad on more purely merchandising considerations. Other things being equal, European purchases of agricultural staples from Canada, Argentina, and Australia tend to be facilitated by the debtor position of these countries. One cannot prove this in figures, but it may be taken for granted, other things equal, that the debtor countries find themselves forced to shade their prices below those of the creditor country. This implies, quality considered and other things equal and weighted, that Europe expects to purchase more cheaply from other surplus-producing countries than from the United States. We cannot resist the conviction that this circumstance has had something to do with the difficulties in the exportation of American farm products during recent years.

THE TREND IN EXTENSIVE AGRICULTURE

For one reason or another, in part in consequence of the World War, a development in extensive agriculture is under way in the world. This is clearly in evidence, for the Temperate Zone, in Canada, Argentina, Australia, Russia, Manchuria, and Mongolia. It is under way, for the Tropical Zone, in the colonies of Great Britain, France, Belgium, and Holland, resting on political as well as on economic considerations. These developments in extensive agriculture have clearly not yet approached their crest; they are supported by developments in machinery and by improvements in transportation, communication, and credit. All of the regions named occupy the debtor position; all will require additional capital. Some will

require new population, others are seeking employment for existing population. Farming operations tend to have less relation to costs in a new, exploitive, and extractive agriculture than in an older agriculture, even of extensive type.

THE TREND IN THE MECHANIZATION OF AGRICULTURE

The inventive talents and the mass production facilities of manufacturers' organizations are finding expression in rapid improvements in agricultural machinery. Improved power-driven machinery lends itself particularly to extensive agriculture. It tends not merely to some increase in outturn per area and to a more marked increase in outturn per man; it also facilitates the rate of the expansion of agriculture in new regions. In this respect, the introduction of power-driven machinery is comparable with the introduction of railroads. Included in this development, furthermore, are bulk handling of grain in Australia and Argentina and extension of grain growing to the limits of soil and climate in Canada, Australia, and Argentina. The mechanization of agriculture, the "Industrial Revolution" in agriculture, facilitates and supports the transition from subsistence agriculture to cash-crop agriculture. This transition is clearly under way in many parts of the world (it is official Soviet policy in Russia), and has an obvious bearing on the proportion of agricultural production moving through commercial channels.

According to Werner Sombart,¹ the proportion of the population of the world engaged in agriculture and pastoral pursuits is estimated at from 1 to 1.2 billion, corresponding to two-thirds of the population of the globe. That is, two persons are assembling the products of the soil which are being consumed by three persons. In the agriculturally most advanced countries of the world with the highest development of mechanization of agriculture,

¹ *Hochkapitalismus*, Vol. III, Part 2, p. 967.

the ratio of farm population to non-farm population is around one to four. Obviously, a small improvement in efficiency of outturn in the backward and the less advanced countries would bring about a heavy change in the stated world ratio of two to one.

In 1920, with a population of 105.7 million, our farm population was 31.6 million, or 29.9 per cent. In 1930, with a total population of 122.8 million, our farm population was 30.4 million, or 24.8 per cent. Put in another way, in 1920 one unit of farm population raised food, feed for domesticated animals, and fibers for 3.34 units of total population, with a surplus for export; in 1930 one unit of farm population raised food, feed for domesticated animals, and fibers for 4.04 units of total population, with a surplus for export. Even if the population of the continental United States in 1960 were to be as high as 150 million, it is reasonable to forecast that not over 25 million will be classed as farm population. Under those circumstances, one unit of farm population will raise food, feed for domesticated animals, and fibers for 6 units of total population, with a surplus for export. We have been and are, of course, heavy importers of certain food-stuffs, especially sugar and vegetable oils. But with full consideration of this fact, it still remains clear that the ratio of farm population to non-farm population, in the light of our total requirements, has decreased strikingly in the United States and will continue to decline.

As one passes country after country in review, noting in current discussions the prevailing views on farm distress, the drift to town, and the need of maintenance of the agricultural class, one is impressed with one outstanding fact. Practically everywhere the argument is conceded that mechanization of agriculture and other factors must lead to a proportional reduction of the farm population; but in each country it is sought to show that this ought not to hold for that particular country, which ought

to be an exception for internal reasons.¹ Or, within a country, it is sought to show that it ought not to hold for a particular form of agriculture. Admitting the argument for the other countries, but denying it for one's own country, leads to the contradictory outcome that the cumulative sum of the individual negations constitutes a rejection of the general proposition which had been accepted. Within recent years a broad shift of technical opinion has taken place among economists and sociologists. An illustration of the prevailing opinion is contained in some remarks at a recent meeting of the British Association for the Advancement of Science.²

THE TREND IN COMPETITION BETWEEN ANIMAL AND VEGETABLE FATS AND OILS

With the advent of large-scale commerce in oil seeds before the war occurred a development of which the implications have not been adequately appreciated. J. M. Keynes in his *Economic Consequences of the Peace* adverted to the fact that it was largely the advent of oil seeds into Europe which sustained the expansion of ani-

¹ "One of the most curious phenomena of our time is, indeed, the widespread belief that it is possible at once to improve the efficiency of farming and to increase the proportion of farmers to total population."—A. G. B. Fisher, "The Drift to the Towns," *The Economic Record* (Melbourne, Australia), November 1929, V, 242.

² "All this emphasis on food is now out of date. We no longer look forward to a future in which an increasing population will be forced by the operation of the law of diminishing returns to devote a larger and ever larger proportion of its whole labour force to the production of food. We know that even in the past, with a rapidly increasing population, the returns to agricultural industry have increased so much that civilised mankind has been able to feed itself better and better, while giving a smaller and ever smaller proportion of its whole labour force to the production of bare subsistence; and we can reasonably expect that the increase in the productiveness of agricultural industry will be at least as great in the future, so that under the combined influence of the 'narrow capacity of the individual human stomach' and the stationary number of stomachs, not only a smaller and ever smaller proportion, but a smaller and smaller absolute number of workers will be able to raise food for the whole."—Edwin Cannan, "The Changed Outlook in Regard to Population, 1831-1931," *The Economic Journal* (of the Royal Economic Society), December 1931, XLI, 525.

mal husbandry there before the war and prevented further rise in prices. With the further development of the colonial policies of European countries since the war, the immediate importance of oil seeds to agriculture has extended from Europe to the United States. It is not too much to state that expansion in commerce in vegetable oils presents for the corn belt an impressive economic menace in the immediate future.¹

Some of the vegetable oils reach back into antiquity, but others are relatively modern products. The list is a long one and includes the oils of the following plants: olive, rape, sesame, peanut, cotton, soy bean, corn, palm, coconut, with the cohune in the offing—not to mention the drying oils like linseed and tung. The oils of particular importance in the future are those of peanut, soy bean, cottonseed, palm, and coconut. Some of these are raised intensively, others in extensive agriculture; some are the products of natural forests, others of tree plantations. Many historical instances are known of one fat crowding out another—sometimes one kind of fat replacing another, sometimes the fats of one region replacing those of another.²

Contrasting vegetable fats with animal fats, the former come largely from the tropics, while animal fats are mostly the product of the Temperate Zone. Vegetable fats may be described as one-stage products of nature, whereas animal fats are two-stage products of nature. The distinction is crucial. In the vegetable fats, the product represents the direct action of sunlight on water and carbon dioxid. In the animal fats, the product represents

¹ For a statement presenting the views of American agriculturists, cf. Charles W. Holman and associates, *The Tariff on Oils and Fats*, a brief presented before the Committee on Ways and Means of the U.S. House of Representatives (Baltimore, Lord Baltimore Press, 1929).

² For a general statement on fats and oils see C. L. Alsberg and A. E. Taylor, *The Fats and Oils: A General View* (Fats and Oils Studies of the Food Research Institute, No. 1, February 1928).

the conversion of starch into fat in a living organism. Other things equal, the cost of producing vegetable fats must be lower than the cost of producing animal fats. If the animals roamed free on public domain and the oil seeds had to be cultivated, a difference in costs might not emerge. But when vegetable oils are secured from natural forests, from tree plantations which yield over a long period of years, or through intensive agriculture with low labor charges, while animal fats are secured in diversified agriculture of the American type, there can be no question of the difference in costs. Without question, the oils of the coconut, the palm, the soy bean, the cottonseed, and the peanut can be laid down in the United States for a cost far below that to which the most efficient husbandman can aspire. In addition, some of these vegetable oils are not principal products but by-products¹—for example, cottonseed oil.

Recently fats and oils from marine fishes and mammals have come into especial prominence. The quantities currently available are large, the costs are relatively low, and under improved technical methods these materials become available for food uses as well as in industrial utilization.

We attempt to present no estimate of world production of animal and vegetable fats and oils. The alleged data are such that the result would not be worth the trouble. A large proportion of the vegetable oils is produced in China, Asia, and in various more or less back-

¹ We shall frequently refer to lard and the other commercial forms of hog fat as by-products. This designation has a justification in the accounting of packing-house operations. It has a still further justification in the technical operations of packing houses. The term does not carry invidious implications. Numerous substances arise as distillation products in the manufacture of coke, and they remain by-products despite their great importance. Cottonseed oil is a by-product of cotton agriculture, but coconut oil is the principal product of the coconut grove. For a description of the technical relations of hog fats as by-products see R. A. Clemen, *By-Products in the Packing Industry* (Chicago, University of Chicago Press, 1927), pp. 77-182.

ward tropical countries. Of the production of animal fats in the pastoral regions of Asia we know next to nothing. But the trend is clear: over the past thirty years the rate of increase of production of vegetable fats and oils has exceeded that of animal fats and oils. The recent developments in production of whale oil seem worthy of an estimate. According to one of the largest factors in the trade, Frank Fehr and Company of London, the outturn of whale oil for the last reported year was over 1.3 billion pounds. When to this is added an estimate of the outturn of fish oils and other marine fats, a gross estimate of 2 billion pounds per annum does not seem too high. The importance of this approximate estimate is realized when it is contrasted with the estimate of lard production in the United States. The future outturn is of course conjectural, but recent investigations into the apparent population and rate of increase of whales indicate that a relatively high outturn may be expected for an indefinite period. Low price will operate to curtail the production of whale oil in a manner not to be expected with vegetable oils, since whaling expeditions have to be financed, while the collection of some of the tropical fats proceeds under less influence of price because of the low living standards in the tropics.

Fats and oils have many industrial uses; for fats and oils as a group (disregarding the drying oils) the food uses are the high-grade uses and the industrial uses are the low-grade uses, as is reflected in their prices. Soap and other detergents represent the largest industrial use of fats and oils, though lubrication and the dressing of leather and fabrics absorb large amounts. The feed use of fats and oils is neither large nor important, principally for the reason that fats and oils when ingested tend to reappear in the flesh of the animal. When animals synthesize fat from carbohydrate, the body fats are specific to the species; for example, sheep and horses synthesize

quite different fats from the carbohydrates of the same grain. When pre-formed fat is ingested in the diet, this tends to be absorbed for the most part unchanged, and the body fats will be modified by the characteristics of the ingested fat. Since the vegetable oils are of low melting point, these cannot be used to fatten animals without producing soft animal fats. Thus, the use of cottonseed in finishing hogs produces hog fat of a low melting point. Since, however, low melting points are not desired in the animal fats, vegetable oils are avoided in the feedstuffs, and when oil cakes are employed these must be used sparingly and be as free of oil as possible.

For practical purposes (again disregarding the drying oils) all animal and vegetable fats and oils are composed of the glycerids of stearic, palmitic, and oleic acids in varying proportions. It is to the variations in the proportions of these three esters that the most important physical properties of fat are due. In so far as it may be technically possible to modify these proportions, the feasibility of substitution over a wide range is established. This is accomplished through hydrogenation, by which oleic acid is converted into stearic acid (partially or fully) with a corresponding change in melting point. In short, hydrogenation is a technical device by which a low melting point can be elevated (but not lowered) and any determined melting point secured.

The technology of fats and oils is highly developed. The practical manipulations include clarification, neutralization, decoloration, deodorization, blending, hydrogenation, and removal of flavors. It is through these manipulations that oleomargarine, margarine, lard compound, and the various cooking compounds are manufactured. It is through these various manipulations that the makers of soap maintain uniformity of product with the use of raw materials selected on the price basis. Within recent years, fish oils and other marine oils have

been drawn into the picture, and today margarine and lard compounds can be prepared from these materials without leaving a trace to suggest their derivation to the layman. Under these circumstances, price becomes the dominant factor in the situation. From the lowest inedible grease to butter is a continuous series of overlapping products; and outside of butter, it is not too much to say that with appropriate treatment every vegetable fat and oil can be used as a substitute, within limits, for every animal fat and oil.

The two principal applications of the technology of fats and oils affecting the corn belt are the manufacture of lard substitute and margarine. To the latter we shall here give no attention,¹ nor to the important question of the use of vegetable oils in substitution for tallow in soap. Lard substitutes are practically an American invention. Europe and the United States have followed different courses: in the United States there is an outstanding manufacture of lard substitutes but only a small manufacture of butter substitutes, whereas in Europe there is an outstanding manufacture of butter substitutes but little manufacture of lard substitutes. Lard substitutes were originally mixtures of lard and vegetable oils; nowadays, however, lard substitutes contain vegetable oils only, for reasons of price and quality.² The annual con-

¹ Cf. Katharine Snodgrass, *Margarine as a Butter Substitute* (Fats and Oils Studies of the Food Research Institute, No. 4, December 1930). See also in Appendix B (p. 632) a comparison of costs of two formulas for butter substitutes.

² The earliest lard compounds contained tallow and lard; then followed compounds containing lard with stearin and cottonseed oil; gradually the proportion of lard was lowered, and compounds contained tallow, stearin, and cottonseed oil; the last step was the manufacture of lard substitute solely from a blend of vegetable oils. Lard may be re-processed to make a product closely resembling the best vegetable lard substitute, but to do this would seem to acknowledge defeat. We use the terms "lard substitute" and "lard compound" as vernacular expressions, without invidious implications. The products in question are today neither compounds of, nor, strictly speaking, substitutes for, lard. Unlike oleomargarine, these prepared fats have achieved an independent position in culinary supplies. The relations of lard to the various

sumption of lard compounds and other lard substitutes in the United States is about 1,170 million pounds. As we shall later point out, the amount of lard manufactured under federal inspection is approximately 1.7 billion pounds, of which approximately 50 per cent goes to export. In a very direct sense, therefore, we have a large exportable surplus of lard because we use so much lard substitute, into which enters even imported vegetable oil to some extent.

The striking contrast between the agriculture and the food supply of Asia and those of Europe and North America during the nineteenth century was in the relation to animal husbandry. Europe and North America relied upon domesticated animals for a large proportion of the protein and fat of the diet; Asia drew protein and fat largely from plants. The explanation is not to be found in conventions of religion or custom, though religious prejudice against animal products controlled certain classes in India. Pressure of population on food supply, low standard of living, maximum utilization of land in terms of calories for the human population, and lower cost of production of vegetable fats and oils determined the agriculture of Asia. In Europe and North America (especially in the United Kingdom, northwestern Europe, and North America) relatively high earning power and the practical absence of pressure of population on food supply enabled the inhabitants of these regions to disregard (in large part) the considerations in favor of vegetable fats and oils which were compelling in Asia. Toward the close of the nineteenth century, however, the price appeal of vegetable fats and oils (in connection with the

substitutes and alternatives made of vegetable fats and oils or mixtures of animal and vegetable materials are very complex—in price, in uses, and in substitution. We have not felt it expedient here to enter into an examination of these relations on account of the extent of the subject. This Institute will shortly issue a book on the cooking fats by C. L. Alsberg and G. M. Weber which will contain a full discussion of the topic.

use of the oil-seed residues in animal husbandry) brought about a continuously enlarging replacement of animal fats and oils with vegetable fats and oils. Since the war, Europe feels most the force of the influences mentioned. Largely for other reasons, but still effectively, substitution has become prominent during this century in the United States, of which lard compounds are the striking illustration. The reasons which compel the use of vegetable fats and oils instead of animal fats and oils in Asia continue to apply with undiminished force. In Europe and in the United States widespread substitution is under way, not because of pressure of population on food supply, but for reasons of price, technical improvements, and trade policies.

There are some reasons to suggest that within the next decade the European countries lying north of the latitude of the Alps will develop the manufacture of lard substitutes from vegetable oils on a scale comparable with their manufacture of margarine. In the colonial and territorial possessions of Great Britain, Holland, Belgium, and France oil seeds of one kind or another grow in profusion. These countries have strong economic incentives to develop their backward colonies and territories. They require the vegetable oils for a variety of uses, while the residues of the expressed seeds are favorite concentrates in the animal husbandry of these countries. In the course of time they will develop the manufacture of lard substitutes, imitating American methods. Familiarity with lard will provoke a certain resistance to introduction of the vegetable lard substitutes; but since the substitutes will be cheaper, the Europeans will learn to use them just as Americans have learned to use them. When that time arrives, American lard will encounter in Europe a pressure of competition far worse than anything in our experience; and when that time arrives, the husbandmen of the corn belt will realize that a lard substitute made

of a vegetable oil, which is a one-stage product, is inherently cheaper to produce than lard, which is a two-stage product.

Finally, another aspect of the question is revealed in our relations to the Philippines. If animal fats competed in the domestic market only with domestic vegetable oils (cottonseed, peanut, and corn), the situation would be difficult enough; but when the animal fats have to compete on the domestic market with coconut oil imported duty-free from the Philippines, the situation becomes much more difficult. If the United States, in consequence of our political relationship to the Philippines, secured from them only raw materials not produced at home, such as rubber and hemp, the corn belt would doubtless regard the political relationship with a complacent benevolence. But when we import from the Philippines annually 200-300 million pounds of coconut oil, which can be used directly and indirectly in substitution for animal fats and oils, the corn belt not unnaturally regards the independence of the Philippines as a consummation devoutly to be wished.

THE TREND IN THE SCALE OF LIVING

When purchasing power is low, the sustenance needs claim the income. As purchasing power rises, the proportion of the income expended for bare sustenance declines. With advancement in civilization, material and cultural, the mere physiology of existence claims less attention and effort. The use of services expands more than the use of goods. Thus, the extension and expansion of the scale of living in every country tends to subordinate the importance of the food supply and to exalt the importance of the almost innumerable goods and services whose utilities lie outside of sheer subsistence. The food supply of this country takes up little more than one-fourth of the

total national income.¹ This trend reduces the importance of the food supply in the scale of living. But in connection with the declining per capita food requirement, the dietary is also modified. Specialties come to be preferred over staples, and replace them when income is high. The specialties are commonly the products of intensive agriculture, while the staples proceed more from extensive agriculture.²

THE TREND IN PER CAPITA FOOD REQUIREMENT

When men direct machines doing work instead of doing the work themselves, their food requirement declines in consequence of the reduction in muscular exertion. With each decade the group distribution within the population, in respect to manual work, is being shifted from excessive labor to hard labor, from hard labor to moderate labor, from moderate labor to light labor, and from light labor to sedentary occupations. What holds for gainful occupations holds also, to a lesser extent, for the household activities of women. We lack indexes of consumption. Because it has not been computed, the extent of the reduction in food requirement of the people of the United States is not adequately appreciated. Possibly the continuing reduction in per capita requirement in this country during the next decade (including reduc-

¹ This estimate is obtained as follows: Ninety billion dollars is accepted as the estimate for the national income in 1929. With the data of the census of distribution may be worked out an estimate of consumer expenditure for food in commercial channels of not to exceed 16 billion dollars. This is too low because it takes no account of food raised on the farm. It is also to be kept in mind that all of the national income is not expended, and the percentage for total income would be different from that for expended income. Provisionally we regard the estimate of 25 per cent as reasonable.

² In a recent analysis of world trade, A. Loveday (*Britain and World Trade*) has laid stress on the fact that, with the improving scale of living, the proportion of the income claimed by the necessaries declines and that available for comforts and luxuries expands, out of which development has proceeded an increasing instability in the economic structure, since disequilibrium between supply and demand arises more easily with comforts and luxuries than with necessaries.

tion of wastes,¹ effect of lowering of average body weight, and saving of body fuel through substitution with machines) will amount to 5 per cent, perhaps even to 10 per cent. This will have an effect in partially offsetting the influence of growth of population on the gross food requirement. This trend is in evidence abroad, to varying extents in different countries, though nowhere yet to the extent revealed in the United States.

With continuing decline in average per capita intake of food in terms of calories, the character of the diet changes. Under the influence of modern educational methods, we expect these changes in the character of the diet to develop somewhat as follows. The use of milk is on the increase, and with it the use of fruits and green vegetables, these three providing the indispensable components of the diet. The use of eggs is on the increase; but the use of meat (in terms of units of protein) is not on the increase. Desirous of maintaining intake of protein while restricting intake of calories, more and more the public will choose the lean meats of younger animals. This choice will operate against pork from heavy animals, especially the lard-type hog. The intake of cereals may decline somewhat, but this will affect the cereals other than wheat. The intake of farinaceous vegetables, such as white and sweet potatoes, will tend to decline, still more the intake of dried legumes. Desirous of restraining overweight, the population will restrict intake of oils and fats. Preference for poultry, baby beef, lamb, and porkers will automatically restrict intake of fat. Among

¹ In Raymond Pearl's statistical measurement of the national food supply (*The Nation's Food* [Philadelphia, W. B. Saunders Company, 1920]), which portrayed the position directly before the war, an allowance for loss and waste was made for each foodstuff. These allowances found a direct reflection in the estimates of per capita intake finally arrived at. As a whole, these allowances were high, but probably not too high. Over the interval, substantial improvements have been made in selection, cultivation, harvesting, grading, transportation, and distribution of foodstuffs, the effect of which is in the direction of reduction of loss and waste.

the fats and oils are many alternatives. We expect the use of milk fat to be increased, that of beef and sheep tallow to be heavily reduced. As between vegetable oils and lard, it strikes us that the consumption of lard will suffer most. It is to be kept in mind that in the diet of the next decade, aside from milk fat, the fats and oils will be strictly calorie foodstuffs and upon them must fall a large part of the retrenchment consequent on decline of muscular exertion and on the prevalent social and medical precepts of avoidance of overweight.

The long-term prospect, in summary, is as follows. The rate of growth of population in the United States is declining and the age distribution is changing in the direction of decline in food requirements per average adult male.¹ With continuing mechanization of urban and rural occupations, the output of muscular work per average adult male is declining. With decline in the workers exposed to cold and with improvement in heating of buildings, the food required to maintain body heat is declining per average adult male. These reductions in requirements will be met, by and large, by corresponding reductions in ingestion of food, if national overweight is to be avoided. The tendency in the diet under these circumstances is to increase the proportion of low-calorie foodstuffs (fruits and vegetables) and to decrease the proportion of concentrated foodstuffs high in calories; this implies an absolute reduction of calories in the form of high-calorie foodstuffs. Cereals as a group and oils and fats (both animal and vegetable) represent the two large groups of high-calorie foodstuffs. It is possible that these will participate equally in the decline in the food intake of

¹ To quote O. E. Baker in his article on "The Outlook for Land Utilization in the United States," *Journal of Farm Economics*, April 1931, XIII, 220: ". . . a quarter century hence, unless the birth rate rises, or the immigration laws are made less restrictive, or unless more meat is eaten per person, or larger markets are found abroad, the farmers of the nation will face a stationary demand for their products, and may thereafter experience even a decreasing demand."

the average adult male; but in view of the present intake of cereals it seems more likely that in the future oils and fats will have to bear more than their proportionate share in the reduction. In the group of oils and fats are many animal and vegetable products. It is possible that in the future decline in intake of oils and fats each of them will share proportionately; but it seems more likely that some of them will be reduced more than others. As between butter and lard it seems quite certain that butter will retain public favor more than lard. As between hog fat and the fat of cattle and sheep, the fat of the latter two will lose favor. As between lard and vegetable oils, it seems to us more likely that lard will lose favor despite the high proportion of Nordics in our population. In short, the corn belt must look forward to declining demand for hog fat per average adult unit of population; and if the trend of decline in per capita intake is more pronounced than the rate of growth of population, the intake of hog fat in absolute terms for the country may be lower ten or twenty years from now than it is today.¹

THE TREND IN THE RATE OF GROWTH OF POPULATION

It is evident that the rate of growth of population is declining in many parts of the world. This is true in North America and in most of Europe outside of Russia; it is evidently not true in Russia and India and probably not true in China, Japan, and the East Indies. When the rates of growth of population in South America and Australasia are adjusted for immigration, it is likely that

¹ Cf. the following statement, from an editorial on "Population and the Food Supply" in *Wallaces' Farmer*, October 17, 1931, p. 6: "With food habits changing as they are, it is doubtful if it will ever require very many more meat animals in the United States than we have today. Lard requirements will probably be less. Probably there will be some further increase in the consumption of dairy and vegetable products. On the whole, however, it may be said that in the United States today we are producing just about enough food to feed the 145,000,000 which our population experts indicate as the point of eventual population stability."

the native rates of growth there will prove to be surprisingly low. A census of population was held in 1930 in practically all countries; within a few years it will be possible to compute the rates of growth and to indicate how much they fall below current expectations. Rate of growth will certainly fall below current expectations based on rate of growth of population up to 1910 in North and South America, in Australasia, and in Europe outside of Russia. It is significant that the declining rate of growth occurs in countries with relatively high purchasing power and the higher rate of growth of population occurs in countries of relatively low purchasing power. The best estimates of population increase in this country suggest a population of 133 million in 1940 and 140 million in 1950.¹ The home market for foodstuffs is due to expand very slowly, if at all. The population of the country in 1940 will ingest no more and will probably waste less than the population in 1930.

When one considers the prospective rate of growth of population in the light of the increased productivity of agriculture and the decreased per capita food requirement, it follows that for the time being mankind has no concern for the food supply. *Mankind at the Crossroads* by E. M. East, *Standing Room Only* by E. A. Ross, and *The Rising Tide of Color against White World-Supremacy* by Lothrop Stoddard have failed to prove a threat to the subsistence of the coming generation. Without question, the productivity of agriculture in the world is now expanding faster than the rate of growth of population. Apparently the rate of increase in food production in the known world is about $2\frac{1}{4}$ per cent per annum, whereas

¹For a comprehensive statement on rate of growth of population see R. R. Kuczynski, *The Balance of Births and Deaths* (New York, Macmillan, Vol. I, 1928, and Vol. II, 1931). As illustration of the rapidity with which population changes may occur it is illuminating to point out that in the United States there were fewer children under five years of age in 1930 than in 1920, but a third more adults over sixty-five years of age.

that of population is scarcely more than 1 per cent per annum. The Neo-Malthusian League must look a long way forward, or backward. The problem of agriculture in the foreseeable future is not to relieve the pressure of population on food supply; instead, relief is being sought for the pressure of food supply on population. At the International Economic Conference held in Geneva in 1927, practically every country represented reported the existence of agricultural distress; and in practically all instances one of the effective elements in the agricultural distress was overproduction relative to effective demand. Relative overproduction has persisted since. For the time being, and for some time at least in the future, the market of the world's food supply is a place where producers, not consumers, seek to bargain. This remains true even if subnutrition persists widely in Asia.

APPLICATION OF THE TRENDS TO THE CORN BELT

These trends—situations and tendencies—constitute the background and foreground of the agricultural problem of the United States. In a particular sense, the background and foreground are important in consideration of the farm problem in the corn belt. Corn and hogs, wheat and cotton, represent chiefly the agricultural staples through which American agriculture reacts on, and is influenced by, the outside world. One must not stress the international relations over the national and local relations; but the international relations must be appreciated and certainly should not be misjudged.

The corn belt has had a heavy share in the post-war agricultural depression. Convinced (correctly, in most years since the war) that farm prices of corn and hogs have not held up in a measure corresponding to prices of goods and services bought for farm use, the corn belt tends to attribute its depression directly to this fact, and ascribes the disparity to the effect of surplus on prices.

It is argued that, whereas purchases are made in a domestic market, sales are made in a world market, on which the surplus of production operates to a peculiar extent in depressing prices. With the average size of the typical farm in the corn belt, the plant investment is too large and the overhead too high to make the raising of low-priced staples remunerative to the American farm family.

SOCIAL AND POLITICAL CONSIDERATIONS

The mechanization of industry and agriculture has increased the leisure time of all, but most effectively in the town and city. With high purchasing power, available leisure time, and low income requirements for food, the standard and scale of living include relatively less of agricultural products and relatively more of other goods and services. Both the absolute and the relative importance of domestic agricultural products in the budget of the national income have become reduced. The effective demand of the domestic market has thus become less for agricultural products than for urban goods and services. The price level of urban goods and services stands relatively higher than the price level of agricultural products. Desirous of expanding their use of urban goods and services, the agricultural class finds the price level of purchases relatively high. The price level of their sales is relatively low. A disparity has thus been developed between net farm income and the urban scale of living sought to be established on the land.

Out of this disparity has emerged the later legislative program of the agricultural class. Regarding himself as laborer, the farmer wishes to enjoy the high wage scale that has accrued to urban workers through restriction of immigration. Regarding himself as producer, he wishes to secure for farm products the elevated price level that has accrued to manufacturers through the protective

tariff. If the agricultural class could secure wages comparable with those of correspondingly skilled urban workers and prices corresponding to those of protected manufactures, land values would decline no further and might later rise with growth of population. To secure for farm workers the benefit of restriction of immigration and to obtain for farm products the elevated domestic price level of the protective system have been the objectives of the more recent agitation for agricultural relief. Gradually the issues have become clarified through discussion. The country is faced with long-term readjustment, not short-term emergency. The political program of agriculture has been designed to bring to the farmer the economic benefits believed to have been conferred on town and city by the protective tariff and restriction of immigration. Through maintenance of the plane of operations and elevation of the income of agriculture, the policy is designed to uphold the agricultural class in numbers, influence, and affluence.

The regional question of surpluses is inseparably connected with the broader question of the utility of export trade. Many of the proponents and opponents of proposed legislative enactments for farm relief have unconsciously missed the connection or have consciously evaded the issue. Without entering in detail into consideration of the national utility of export trade, it is advantageous early in the discussion to state the position advocated by most agricultural producers.

The reasons which may be adduced in favor of a policy of continuous expansion in export trade may be grouped under four headings:

1. The commercial interest of the producer class.
2. The social and political interest of the producer class.
3. The commercial interest of the distributor class.
4. The international account.

1. Agriculture is a gainful occupation which most farmers follow as a long-term vocation, to enjoy a type of living, to make money, and to accumulate savings. The direct commercial incentive is the mainspring of the operation. If, as, and when the process of producing crops for export yields no profit for the producer class, the objective of exports is lost. If, as, and when a volume of outturn without exportable surplus is demonstrably more profitable than a volume of outturn with exportable surplus, the lesser outturn should become the commercial rule of action. Whether one analyzes production as short-time or long-time operation, in terms of strict price economy or in terms of broader welfare economy, the answer will be the same. Profit, not volume, is the true objective in agriculture. The farmer is under no obligation, economic or social, expressed or implied, to turn out a profitless volume of crop for the profit of others.¹ Agriculture is not an insurance company issuing an insurance policy on the food supply without payment of a premium.

In every agriculture afflicted with a "surplus" the idea persists that it ought to lie within the scope of human ingenuity to dispose of a large crop at the same price as a small crop. Underconsumption sounds better than overproduction. New uses, new markets, increased efficiency in merchandising, and advertising are relied on to dispose of the added fraction at the same price as the previous

¹ Henry Wallace, in *Wallaces' Farmer*, February 15, 1930, p. 6, has remarked that "it pays the country to have an exportable surplus, tho it doesn't pay the farmer." It is an important admission that the exportable surplus does not pay the farmer. But where is the demonstration that our surplus of corn and hogs has paid the country and what is to be understood by "pays the country"? More pertinent are the following declarations: "A business enterprise can serve the community by making goods only on condition that, over a period of years, its operations yield a profit."—W. C. Mitchell, *Business Cycles* (New York, National Bureau of Economic Research, Inc., 1927), p. 105. "We should export those agricultural products which, sold in foreign markets, will return more net profit than substitute products sold on a domestic market basis."—O. C. Stine, "What Agricultural Products Had We Best Export?" *Journal of Farm Economics*, January 1931, XIII, 37.

outturn. The surplus problem as a price problem has been quite as acute in importing as in exporting countries. The peasant of Germany has deplored the large wheat crop in Canada quite as much as has the wheat grower in the United States. The American wheat grower complains that the "world" fixes the price, whereas the peasants of Europe complain that North America fixes the price. Volume, rather than profit, has become the false lure of agriculturists.¹

2. It is widely felt that the farm population has important social qualities contrasted with the urban population. Thus it is sought to expand the dimensions of the class or prevent its contraction, in order to extend its influence as well as its affluence. Since influence of the farm population is hard to picture without affluence, maintenance of the desired size of the farm population is by some regarded as entailing a contribution by the state. We are not here concerned with the desirability of such action; but it is important to realize that the size of the class as determined by strict commercial interests, and the size of the class as predicated by sociological considerations, may be different.

3. Volume of agricultural production represents traffic for carriers and business transactions for bankers, merchants, manufacturers of accessory supplies, and exporters. These are large elements in the national life. We have never heard the thesis advanced, as one of the tenets of competition in modern capitalism, that the pro-

¹The desire for high production is not peculiar to the farmer, he merely follows manufacturers. The present depression has as one of its contributing causes the rule of manufacturers that there was no limit to what could be sold if salesmanship were effective. The overextended corn acreage is in the same position essentially as the overextended plant capacities of shoe factories, coal mines, lumber mills, and radio factories. In both town and country, temporary circumstances of unusual demand and prices have led to the expansion both of low-cost and of high-cost producers; when the unusual supporting demand declined, unemployment of plant and labor followed. This struggle, it is now clear, is no more easy for factories than for farms. At the close of 1931 it seems fair to declare that urban distress is more extreme than rural distress.

ducer class ought to bring forth raw materials without profit in order that profitable transactions should be created for distributors and manufacturers. That this state of affairs has frequently happened in the case of large crops is freely conceded. There are of course important effects of large crops outside of the producer groups. Large crops usually mean cheap raw materials for the manufacturers who process them. They mean expanded transactions for bankers, carriers, warehouses, merchants, manufacturers, and exporters. The consequence may well be that large crops provide prosperity for everybody except the producers; but the influence of large crops on general business conditions, however important, does not in itself obligate producer classes to provide such contributions.

4. The utility of exports in the international account is mainly threefold: exports maintain the gold reserve of the system of currency, exports pay for imports, and exports spring from and develop into foreign investments. Beyond these obvious advantages, the conventional drive for exports is to a considerable extent the expression of old-fashioned, masked mercantilism. However desirable the credit items in the international account, it is not the announced or expected function of agriculture to provide them without profit to the producer class.

When all is said and done, with appropriate sympathy for broad considerations, the commercial profit of the producer class is the only safe basis for judging agricultural operations, including surpluses and exports. After the profit of the producer class is assured, then the subsequent considerations find place. The Farm Board has approached the problem without evasion; it has urged the growers of cotton and wheat to adjust acreage in the direct commercial interest of the producer class. This, we take it, must be the definitive basis of action of agricultural policy.

CONCLUDING OBSERVATIONS

The commercial problem of the surplus of the corn belt (aside from war effects) has arisen mainly as the consequence of the influence of four developments.

1. *The decline in the rate of growth of population of North America and Europe, ex-Russia*, a decline unexpected by agriculturists. The population of these two regions in 1930 (reduced by war and pestilence as well as by change in birth-rate) is substantially less than was expected at the beginning of the century. The trend of declining rate of growth of population will continue as the expression of irreversible factors clearly under way.

2. *The mechanization of society*.—The industrial revolution has extended into agriculture and into the home, and is being further expanded in urban industry and in transportation and communication. The result, on thermodynamic grounds, is decline in the food requirements per head of population.

3. *Technological advances of physics and chemistry*.—Aside from milk fat, improvements in the technology of fats and oils have had the practical effect of making all vegetable fats and oils coequal with the fats and oils of warm- and of cold-blooded animals, as sources of energy in the diet of human beings.

4. *Relative costs of production of vegetable and animal fats and oils*.—The cost of production of vegetable fats and oils as a class, especially in the tropics, is lower than that of animal fats and oils. This net effect is due, among other factors, to the circumstance that vegetable fats and oils result from a one-stage process, whereas animal fats and oils are secured through a two-stage process.

The combined and cumulative effect of these developments brings about contraction in the effective demand for fats and oils in the food supply of North America and Europe ex-Russia. Whether this contraction in demand

is absolute or only relative is not statistically determinable; but the difference in effect on producers is merely one of degree. Probably more important to producers of animal fats and oils is the preferential competitive position attained by vegetable fats and oils through technical improvements and advantage in cost of production.

This broad development is of relatively recent occurrence, principally within thirty years. Without question, a profound impetus was given, directly and indirectly, by the World War. The Treaty of Versailles and the redistribution of tropical and other territorial possessions created political and economic alliances favorable to vegetable fats and oils and unfavorable to the animal fats and oils of North America. The direct and indirect effects of the World War were, however, quantitative, accelerating the rate of developments inherent in society and under way before the war; but the acceleration of these developments imposed upon the agriculture of the United States an unforeseen burden of adjustment during the present generation.

The doctrine of protection has passed through three stages: the fostering of infant industries, the safeguarding of the home market, and the equalization of costs of production. The fostering of infant industries meant nothing for agricultural staples. The safeguarding of the home market meant nothing for agricultural staples of which we were a heavy net exporter. The equalization of costs of production has a limited application in a net exporting country. In our judgment, the prospect of fixing tariff rates on agricultural products on the basis of comparative costs of production is illusory. The retention of the home market is the objective of farmers, irrespective of costs of production. Certainly the position of animal husbandmen in the corn belt is that protection should give them the home market, for example for beef, irrespective of production costs in Argentina.

The farmers in the corn belt seem to accept the political formulation of protection, to the effect that the benefits of protection are available to all producers. Free traders deny that the benefits of the tariff can be equalized for all classes of producers. A fair statement of this position is the following:

Protection, as it will often appear again, is a means of favouring some industries only at the expense of others. If the State insists that all agricultural labourers shall have a given standard of living—represented, say, by £2 a week at present prices, and desires also that the number of agricultural labourers shall not fall materially, it must not merely fix a minimum wage; it must secure to the farmers a sufficient market at a price justifying that wage. If the home market is large enough, it can secure both its aims *for agriculture* by a protective tariff; if the home market is not large enough, the State may still break a way into sufficient foreign markets *for agriculture* by bounties on export. Broadly speaking, a country can have any given industry at any given standard of life by paying for it, because this is a problem of distributing the national dividend.

But it cannot generalise this for all industries.¹

In short, the possibility of equality of agriculture with industry is denied for a net exporter country, and this denial is not far from the alternative political proposition frequently enunciated in the corn belt—that, if the prices of farm products cannot be raised behind the tariff wall, the tariff wall must be lowered for imports to bring down prices of manufactured goods.

¹ W. H. Beveridge and others, *Tariffs: The Case Examined* (London, Longmans, Green & Company, 1931), p. 51.

PART I. NATURE, EXTENT, AND CONSEQUENCES
OF A SURPLUS OF CORN AND HOGS

CHAPTER II

CORN PRODUCTION AND DISPOSITION IN THE UNITED STATES

Introduction—Production of corn—Disposition of the corn crop—Trend in utilization of corn: Corn as feedstuff; Corn as foodstuff; Industrial use of corn—Definition and measurement of surplus of corn—Surplus of corn as determined by acreage or yield per acre—Tendencies making for surplus—Summary

INTRODUCTION

Corn is the leading crop in the United States, in acreage and value of product. The area in corn is usually around 100 million acres. The farm value, on the basis of December 1 farm prices for cash corn, averaged close to 2 billion dollars a year during the past nine years (1922–30). Directly and indirectly it constitutes one of the country's two principal sources of food. The direct food use, chiefly in the form of corn meal, has been declining for years. Most of the crop is fed to quadrupeds and poultry; indirectly, therefore, it is an important source of protein. The largest fraction of the crop is fed to swine; hence more of it reaches the consumer in pork products than in any other form.

The world corn crop, primarily a feed crop, is now over 4 billion bushels. With favorable weather, the corn crop of the United States is around 3 billion bushels;¹ that of Europe ex-Russia, 500–600 million bushels; Russia, over 100 million bushels; Africa, 100–200 million bushels; Asia, 100–200 million bushels; Argentina, 300 million bushels; and Brazil, over 100 million bushels. Quite generally it is to be said that limitation is not now cultural or climatic, but is rather related to and conditioned by the number of animals to be fed and marketed.

¹ See Appendix Table XXII for relation of the United States corn crop to the world corn crop.

PRODUCTION OF CORN

Corn has maintained its relative position in American agriculture during the past fifty years, which is especially significant when one considers the expansion of land settlement west of the Mississippi since 1880. Since 1880 the number of farms has increased from 4,008,907 to 6,288,648 and the land in farms from 536,081,835 to 986,771,016 acres; the population of the country has increased approximately from 50 million to 123 million and the center of population has moved westward by several hundred miles; the acreage planted to corn has risen from around 60 million to 95-105 million acres. During this interval, the average statistical farm has contained close to 16 acres of corn. The relative constancy of the agricultural effort and area devoted to corn is to be seen in Table 1, which contains figures computed from census data.

TABLE 1.—NUMBER OF FARMS IN THE UNITED STATES, LAND IN FARMS, ACREAGE OF CORN, AND RELATION OF CORN ACREAGE TO TOTAL FARM ACREAGE, ACCORDING TO CENSUS REPORTS*

Year	Number of farms (thousands)	Land in farms (thousand acres)	Acreage of corn* (thousand acres)	Average corn acreage per farm	Relation of corn acreage to land in farms (percentage)
1880.....	4,009	536,082	62,369	15.6	11.6
1890.....	4,565	623,219	72,088	15.8	11.6
1900.....	5,737	838,592	94,914	16.5	11.3
1910.....	6,362	878,798	98,383	15.5	11.2
1920.....	6,448	955,884	87,772 ^b	13.6	9.2
			(97,170) ^c	(15.1)	(10.2)
1925.....	6,372	924,319	82,329 ^b	12.9	8.9
			(100,863) ^c	(15.8)	(10.9)
1930.....	6,289	986,771	83,162 ^b	13.2	8.4
			(97,856) ^c	(15.6)	(9.9)

* Data from *Fourteenth Census of the United States, 1920*, V, 38, and *Census of Agriculture, 1925*, p. 3, supplemented by data obtained through correspondence with the Bureau of the Census; also from *Agriculture Yearbooks, 1928*, p. 702, 1930, p. 626, and 1931, p. 615.

^a Acreage of preceding fall.

^b Corn harvested for grain.

^c Estimate of Bureau of Agricultural Economics.

In Appendix Table I are to be found the population of the country, the corn acreage, the corn crop, and the count of hogs from 1880 to date, also the per capita acreage of corn, the per capita corn supply, and the per capita hog supply (in units) from 1880 to date. This table serves as background.

The trends of production of corn and hogs are shown in Chart 2, prepared from the data in Appendix Table I. The per capita corn acreage has declined from around one and a fourth acres in the early 'eighties to below nine-tenths of an acre at the present time. The per capita corn production, between 30 and 35 bushels in the 'eighties, has gradually but irregularly declined during the five decades and now stands around 20-25 bushels per capita per year. With the small crop of 1930, the per capita production fell below 17 bushels.

These declines are largely the expression of urbanization of the country and decrease of exports; but they remain significant in the light of the fact that a surplus of corn and hogs persists despite pronounced per capita decline in the agriculture devoted to corn and hogs.

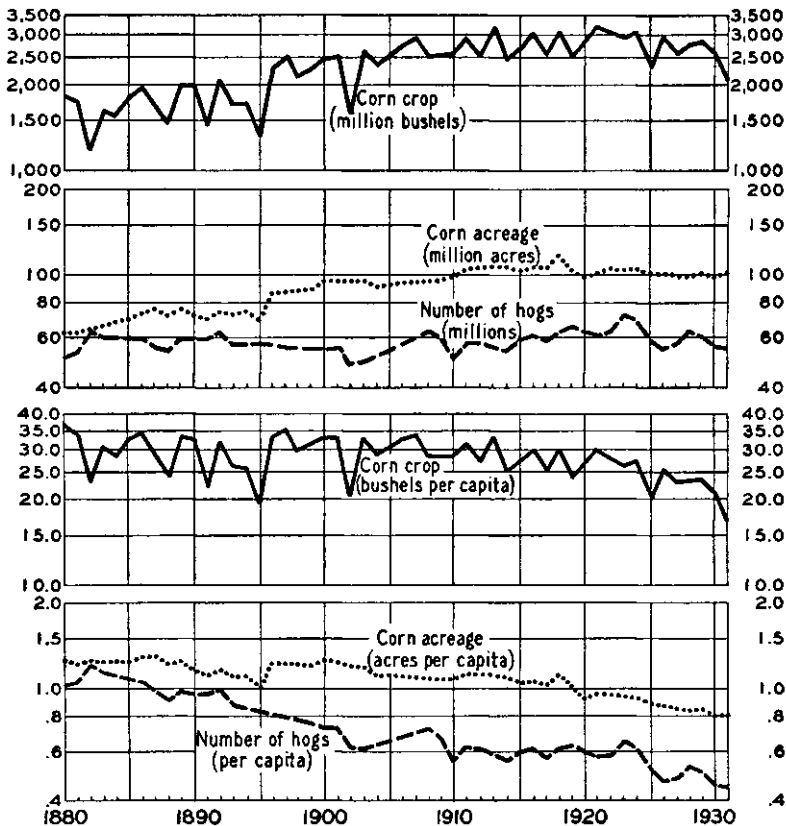
The acreage of corn is very unevenly distributed over the country, in particular, the commercial acreage. The corn belt raises around two-thirds of the reported corn of the country. Of the total corn crop during the crop years 1926-30, approximately 47 per cent was raised in five states stretched in line across the central valley—namely, Ohio, Indiana, Illinois, Iowa, and Nebraska.

Over the interval, as result of corn breeding and selection, the area has enlarged in which corn may safely be grown. The expansion of corn raising in Minnesota affords an excellent illustration of the northward extension of corn growing.¹ Increased also is the facility of raising

¹Not only is corn extending northward (especially flint corn), but also westward. It has long been taught that corn could not make a crop west of the Rocky Mountains because of the cool summer nights there prevalent. The problem in the northern tier of states east of the Rocky Mountains, and in Can-

CHART 2.—TOTAL AND PER CAPITA CORN CROP, CORN ACREAGE, AND NUMBER OF HOGS IN THE UNITED STATES, 1880-1931*

(Logarithmic vertical scale)



* Based on data in Appendix Table I.

ada, is so to shorten the period of maturity that corn will make a crop before frost time, with the aid of warm summer nights. West of the Rocky Mountains, the problem is to develop a corn that will make a crop in a longer frostless season with cool summer nights. Both problems are being solved. Also, corn breeders are now differentiating between grain corn and ensilage corn—the one developed for ears with little reference to leaf and stalk, the other developed for volume of leaf and stalk, as well as for ears.

corn, due to improvements in machinery. The equipment available for preparation of the soil, planting of seed, cultivation of the growing plant, and harvesting of the ripened ears has strikingly increased the number of acres of corn that can be handled by one man. Corn lends itself poorly to one-crop farming, needs to be rotated with other crops, and does best in a scheme of diversified agriculture including small grains, legumes, and planted pasture, but varying from region to region. To this must be added the fact that corn is most advantageously fed on the farm where it is grown.

The operation of these several factors has resulted in a practical limitation of the annual corn acreage below the number of acres to which corn is climatically adapted. Considered from all standpoints, 100 million acres of corn seems close to the maximum figure currently regarded as advantageous. Since 1910 the acreage of corn has exceeded 100 million in every year except four; the highest figure was 116.7 million. But it seems to be the opinion of experts that a planting of over 100 million acres of corn is likely to be the expression of undesirability, or failure, of other crops, especially wheat, barley, oats, and cotton. When one considers the character of the land that has gone into farms since 1900, it does not seem reasonable to expect the proportion well adapted to corn to be as high as it was in the beginning of the century. Whenever the acreage of corn is notably over 100 million, this probably represents the line of least resistance or a choice of evils for a certain number of farmers.

The yield of corn fluctuates widely under climatic and other influences, and the average for yield annually secured by using sample acreages and yields must not be accorded too large a meaning. Long-term trend of production is more the expression of acreage than of yield per acre. Nevertheless, as a result of selection of strains adapted to the localities, testing of seed and better culti-

vation, the yield per acre is rising, especially in the corn belt. Good farming, as well as good land and favorable climate, counts in the yield of corn per acre. That yields have been rising is indicated by the fact that the curve of per capita acreage is declining more rapidly than that of per capita production.

There are many obvious difficulties in estimating the supply of corn, and the plus-and-minus error in the crop report must be relatively heavy. For states in the corn belt the acreage report of the census and the acreage estimates of the crop-reporting service ought to be relatively accurate, but this is not the case south of the Ohio River or east of the Allegheny Mountains. For 1919 the census report of acreage harvested for grain was 87.8 million acres, while the corn acreage of the crop-reporting service was 97.2 million acres. In 1924, the census report of corn acreage harvested for grain was 82.3 million acres, while the estimate of the crop-reporting service was 100.9 million acres. In 1929, the census report of corn acreage harvested for grain was 83.2 million acres, while the estimate of the crop-reporting service was 97.9 million acres. The reports on condition and yield tend to be misleading because corn is so often injured in the last fortnight of the growing period. It is very difficult to adjudge the proportion of soft corn, the amount cut for fodder, and the amount "hogged down." The stand, the moisture content, the variety, the bulk in the crib, and the ratio of corn on cob to shelled corn, all contribute to the variability of the crop estimate. The crop estimate ought to be revised in the spring on the basis of the loss of weight during the winter, but this is not practicable. All in all, the plus-and-minus error in the corn-crop estimate may well be over 100 million bushels, a figure which bulks large against the corn crop passing to terminal markets and especially against the amount passing to export.

DISPOSITION OF THE CORN CROP

On the basis of the crops of 1912-21, the Department of Agriculture estimated the average disposition of the crop harvested for grain in the United States, as shown in Table 2. Corresponding estimates for recent years would probably show an increase in the proportions fed to hogs, cattle, sheep, and poultry, and a decrease in most of the other fractions. Probably corn used in non-food manufactures (outside of alcohol) is on the increase. With the reduction in number of horses in cities and even on farms, there has been a substantial decrease in the amounts fed to horses. There has also been a decline in the domestic use of corn meal for human food, and in the proportion exported. It is probable that at present half of the corn crop is fed to hogs, and that more than 90 per cent is fed to animals.

TABLE 2.—APPROXIMATE DISPOSITION OF CORN CROP HARVESTED FOR GRAIN IN THE UNITED STATES, AVERAGE 1912-21*

(Percentages of total)

Method of disposition	On farms	Not on farms	Total
Fed to livestock			
Hogs	40.0	...	....
Horses and mules.....	20.0	...	....
Cattle	15.0	...	....
Poultry	4.0	...	....
Sheep	1.0	...	....
Total	80.0	5.5	85.5
Used domestically for human food.....	3.5	6.5*	10.0
Exports as grain.....	...	1.5	1.5
Other uses .....	...	3.0	3.0
Total	83.5	16.5	100.0

* *Agriculture Yearbook, 1921, p. 165.*

* Ground in merchant mills, but not all used for food.

To the fact that the disposition of the corn crop includes only a limited number of uses has been attributed part of the marketing and economic problem of corn growers. The outlets are too few; additional outlets, new uses for the crop, are being sought, with the decline in public favor of corn meal, hominy, mess pork, and lard. Potential new uses are known in numbers and many of them are technically feasible; it is use on a large scale which is lacking.

TREND IN UTILIZATION OF CORN

It does not lie within the purpose of this work to enter into a minute analysis of the domestic utilization of corn. It is, however, important at the outset to appreciate the existence of certain trends in consumption and to evaluate their importance for the next decade. It will be advantageous to separate the consideration of corn fed to domesticated animals from that of corn included in the food supply of the human population.

CORN AS FEEDSTUFF

The amount of corn used as feedstuff is the product of two factors: the number of domesticated animals receiving corn and the amount of corn received by each animal during its lifetime. To evaluate these factors the country must be considered on a regional basis, or, better still, by states. The place of corn in the feeding program of hogs, cattle, sheep, and poultry varies widely from region to region and to some extent within regions from state to state. An increase in the count of swine, cattle, sheep, and poultry implies some increase in demand for corn as feedstuff, but not an increase necessarily proportional to augmentation in count of animals; the influence on demand for corn would be modified by the kind of animals involved, the regional distribution of the in-

crease, and the availability and prices of other feedstuffs. An increase of cattle grown in Iowa has a different meaning in respect of demand for corn from an increase of cattle in California or an increase of cattle grown outside and shipped into Iowa. It is particularly in relation to hogs that increase in numbers implies increased demand for corn; but an increase in numbers of swine in Iowa has a different meaning for demand for corn than an increase in number of swine in California or in Pennsylvania. Broadly considered, therefore, while increase in animal husbandry implies increase in demand for corn, the correlation cannot be close, for a variety of reasons which become apparent when one discerns the position of corn and other feedstuffs, state by state, in the animal husbandry of each region.

More important, because consistently in one direction, is the trend in the utilization of corn in animal husbandry. With each decade, not merely perceptibly but substantially, less feedstuffs are required per census unit of animals and per unit outturn of edible animal products. This trend is the product of four factors: (1) reduction of death-rate in the newborn and during infancy, with improvement in ratio of births to breeding stock and in the ratio of animals born to animals marketed; (2) gradual replacement of nondescript animals of inferior strains by selected animals of superior strains; (3) slaughter at earlier age, so that the average term of life at market maturity is reduced; and (4) continuous improvement in the efficiency of rationing and feeding operations.

With the birth-rate increased and infant mortality reduced, the number of animals productively brought to market maturity per unit of breeding stock increases. There is steady progress and the point is of special importance in the case of hogs. The average litter brought to maturity was, not long since, as low as three; there is no reason why it should not have been five or six, and rapid

improvement is being made in this respect. The "ton liters," of which one hears so much, represent large litters in numbers as well as efficiency in feeding.

Everywhere scrub animals are disappearing; quite generally the proportion of blood of selected strains is becoming more predominating; in most states the proportion of purebreds is increasing. The selected strains lend themselves to intensive animal husbandry. As the scourges of animal husbandry are brought under control—Texas fever, tuberculosis, hog cholera, and contagious abortion—progress in elevation of the average quality of domesticated animals becomes more rapid. Improvement in grade brings about both hastening of market maturity and efficiency in feeding operations.

The shortening of the term of life of domesticated animals through hastening of marketing maturity is a highly important factor and one not fully appreciated. Public taste inclines to the flesh of younger animals. We prefer broilers to roasters and boilers; and when we use roasters and boilers, we prefer those of medium age and weight to those of old age and heavy weight. Gradually the preference for baby beef has superseded the preference for the flesh of steers of from three to four years of age. We prefer lamb to mutton. We prefer the pork of the pig of six months to that of the hog of one or two years of age. This trend not only appears in the home and public eating-place, but is equally in evidence in the livestock shows and in the feeder markets. The trend of public taste is in the direction of cuts from younger animals, from smaller carcasses, with the preponderance of lean over fat characteristic of younger animals. The implication of this trend in the direction of saving of feedstuffs is enormous. In the life term of each animal is a point up to which increase in growth carries with it an increasing recovery of feedstuff units in terms of units of edible animal products; beyond this point of time in the life of

the animal, the recovery of feedstuff units declines in terms of units of edible animal products. This optimum point in relation to recovery of feedstuff units in terms of units of edible animal products falls relatively early in the life of the animal.¹ With selected strains the optimum age is reduced. In accordance with this trend, the average age at which animals come to slaughter is being gradually lowered, with the result of a tremendous saving in feedstuffs, because the maintenance requirements of the herd are reduced and the proportion of feedstuffs productively recovered as edible secondary foodstuffs is increased. The gain and saving from the side of animal husbandry are both relative and absolute. This means a gradually falling per capita requirement of feedstuffs per unit of animal population; if the outturn of feedstuffs is not adjusted to this saving, a surplus of feedstuffs results from the very efficiency of animal husbandry.

Lastly, feeding practices have become enormously improved, and this improvement will continue to have a gross effect as more and more farmers adopt the improved methods of feeding and finishing animals. Through improvement in feeding, the average number of eggs per hen is rapidly rising. The average annual outturn of milk per cow is progressively rising. The number of bushels of corn required to produce the hundredweight of marketable cattle and hogs is steadily declining: with the aid of mineral ingredients and forced feeding of a correctly balanced ration, today 7 bushels of corn turns out as much pork as 10 bushels used to produce. These progressions are so substantial that it is possible to envisage not merely an increasing outturn of edible animal products without change of number of domesticated ani-

¹ The optimum age of meat production per unit of feedstuffs was a point of crucial importance in European countries during the World War. Cf. T. B. Wood, *The National Food Supply in Peace and War* (Cambridge, England, 1917), pp. 28-38; also Paul Eltzbacher, *Die deutsche Volksernährung und der englische Aushungerungsplan* (Brunswick, 1915), pp. 113-30.

mals, but it is warranted to forecast an increase in outturn of edible animal products as large as the rate of growth of the human population of the country, coincident with a progressive reduction in the number of domesticated animals.¹

It may be observed at this point that the relative trends of production of beef, pork, and milk involve influences on disposition of corn and other feedstuffs. Hogs and dairy cows are much more efficient than beef cattle in converting feedstuffs into edible animal products. If the national consumption of beef were to rise, in replacement of the consumption of pork and milk or still more in addition to it, this would indirectly enlarge the market for corn. But the trend since the war has been in the opposite direction: the use of beef has been declining while that of pork and milk has been rising. This implies a lessening in the average indirect grain requirement per head of human population, with a resultant contraction of the home market for coarse grains.

The cumulative result of the full influences of these factors is obvious. There results a declining trend of utilization of feedstuffs in the United States, a decline that is relative with variation in numbers of domesticated animals and absolute with a constant number of domes-

¹ It is significant to observe that, while the corn belt is seeking new outlets for corn, at the same time changes in management are being introduced into hog production that have the effect of saving corn. Not only improvements in selection of animals and finishing for early maturity, but the expanding use of manufactured feeds for shoats, the increasing use of tankage and other high-protein concentrates, the use of mineral and vitamin mixtures, and the McLean system result in a saving of corn. This runs into relatively large figures. It would not be an improbable guess to assume that 5 billion pounds of federally inspected pork could be produced today for 200 million bushels less corn than would have been required for that outturn of pork before the war. Cf. L. J. Norton, "Some Recent Changes in Meat and Feed Crop Production," *Journal of Farm Economics*, July 1927, IX, 305-17. Without going into the technical literature of animal husbandry and the detailed computations of nutritional experts, see O. E. Baker, "Changes in Production and Consumption of Our Farm Products and the Trend in Population," *The Annals*, March 1929, CXLII, 97-146; and A. F. Woods, "Outlook for the Dairy Industry in the United States," *ibid.*, pp. 245-49.

ticated animals. This means that the home market for animal feedstuffs tends to decline. To a varying extent from year to year, this implies that the home market for corn as feedstuff tends to decline. For the coming decade the existence of the trend is not disputed; only the extent and the rapidity of the decline remain to be observed.

CORN AS FOODSTUFF

The use of corn products in the national diet has declined substantially since the war. Before the war, according to Pearl,¹ corn contributed about 7 per cent of the calories of the American diet, exceeding beef and ranking fifth, after wheat, pork, dairy products, and sugar, in the order named. No comparable compilation for the post-war consumption is available, but it is clear that corn does not now contribute 7 per cent of the national calories. The quantity of corn that could reasonably be assigned to annual human consumption has declined to around 45 pounds at the present time. According to Holbrook Working,² the apparent per capita consumption of corn meal declined from 0.39 barrels in 1904 to 0.21 in 1914 and 0.13 in 1921. We question whether the decennial census of 1930 will indicate any significant increase in per capita consumption of corn meal, corn flour, corn starch for food purposes, hominy, or corn breakfast cereals over the figures indicated in recent biennial censuses. On the other hand, we incline to the view that the use of corn oil and glucose made from corn starch is on the increase. The decline into which the use of corn as a bread grain has fallen may be ascribed to several factors: industrialization of the Southern states, elevation of the post-war plane of income, and revulsion

¹ Raymond Pearl, *The Nation's Food* (Philadelphia, W. B. Saunders Company, 1920), pp. 252-58.

² "The Decline in Per Capita Consumption of Flour in the United States," *WHEAT STUDIES OF THE FOOD RESEARCH INSTITUTE*, July 1926, II, 279.

against corn bread as a war bread. To this must be added the circumstance that home baking is being supplanted by commercial baking and corn bread does not lend itself to delivery-route handling. The Volstead Act has excluded a large volume of corn from manufacture into beverages. In 1914, 21.3 million bushels of corn and corn products went into the manufacture of fermented and distilled beverages; in 1929 the figure was only 9.8 million bushels.¹ Crystalline glucose may now be prepared from corn starch, and a new ruling permits an expanded use of corn sugar without labeling. From corn oil not much is to be expected as an outlet for corn because of the plethora in fats and oils, existing and potential, in the United States. In any event, corn oil is a by-product of fabrication of starch.

INDUSTRIAL USE OF CORN

As to the other parts of the corn plant, literally hundreds of substances and articles can be manufactured from corncobs and cornstalks and leaves. The long list ranges all the way from chemical substances such as furfural to news print, insulating fabrics, and building materials. Despite high labor cost in the collection of the raw materials, the manufacture of a number of useful things from corncobs and cornstalks is progressing; in other directions, such as the fabrication of motor fuel from corncobs and cornstalks, for use on the farm, no progress, it seems, is being made. The difficulty lies not in the possibility of progress in these directions, nor yet in the commercial practicability, as judged by individual plants. The difficulty lies in the dimensions of the undertaking to utilize industrially even a small proportion of the corncobs and cornstalks that now bring in only a

¹ Data from Bureau of Prohibition, U.S. Treasury Department, *Statistics concerning Intoxicating Liquors* (January 1930), p. 53. Apparently the use of corn products in the illicit fabrication of alcoholic beverages is on the increase.

small return as feed and fertilizer. In order to have the industrial by-products of the corn plant contribute a perceptible addition to the farm income now secured only from the grain, the by-product industries will need to be expanded to dimensions far beyond anything yet envisaged. In short, numerous outlets are available for the corn plant as source of raw industrial material as well as of foods and feedstuffs; but the rate of progress is slow, too slow to be counted on as a source of income per acre. Corn used in the feeding of work animals is partly used for industrial purposes. Since 1920, the decline in numbers of horses and mules has approximated 7 million, releasing around 20 million acres of crop land, previously planted to supply fodder for work animals.¹ It is not to be foreseen whether the number of work animals in town and country will further contract, remain stationary, or expand during the next decade, though it is clear that the competition of tractors is becoming annually more effective. Corn is an outstanding potential source of raw material for manufacture of industrial alcohol, but is little employed on account of availability of cheaper materials. If imported molasses were kept out by a high tariff, this would leave domestic molasses, potatoes, corn, sawdust, straw, and cornstalks as the most available raw materials for industrial alcohol.² Under such circumstances, the cost of industrial alcohol would presumably rise, the amount demanded would be reduced by use of substitutes, and the place of corn in the changed industrial program cannot be foreseen. We are told that part of the cornstalks are to be used for paper, part for lumber substitutes, part for chemicals, and the rest to make alcohol for motor fuel. All this is possible technically, but will not be done in time to relieve the corn belt

¹ Nine million horses used to consume 200 million bushels of corn annually.

² Alcohol is also being made from petroleum, natural gas, and blast-furnace gases.

in the coming decade. There is no present commercial incentive for the corn belt to produce corn, corncobs, and cornstalks as industrial raw materials in anticipation of technical developments; if, as, and when industrial products made from the corn plant become a profitable outlet for corn growers, an added new supply on farms will meet the demand at the factories. No progress has been made in this direction, in the last decade, which is of practical significance to the corn crop as a whole; and in the present low state of prices of raw materials, the prospect for the immediate future is not bright.

DEFINITION AND MEASUREMENT OF SURPLUS OF CORN

The term "surplus," as used in agriculture, has come to carry various meanings and connotations. Much depends on whether one considers supply or demand primarily. In the sociological sense, no surplus exists, since unsatisfied want always persists; thus, it is urged that apparent surplus is a residual item, the result of underconsumption. The notion of surplus that proceeds from a quantitative appraisal of supplies and requirements has entirely different attributes. When finally, into the relations of the term "surplus" are drawn considerations of price level and purchasing capacity, a still different concept emerges. Perhaps the most useful definition of surplus is to regard as surplus outturn more of the commodity than can be sold at a profit.

In political discussions one finds a long list of reasons and justifications for the existence of an agricultural surplus: the farmer cannot prevent the surplus, which is the result of climate; surplus results from established rotation of crops; surplus is the expression of full-time employment of the farm and the farmer; the profit of farming lies in the surplus; the surplus (large crops) means good business; the surplus is an insurance of the food supply;

agricultural surpluses are needed to pay for imports; the surplus enlarges the favorable balance of merchandise trade; the surplus represents the larger rural class, contributing to a balance of population; and others. The term "surplus" is of course a relative term, just as "overproduction" and "underproduction," "high prices" and "low prices," are relative terms.

An explanation of a part of our surplus of agricultural products is to be found in local ambition. The world over, freedom of trade between the forty-eight states of the American Union is regarded as an outstanding illustration of the economic doctrine of comparative advantage. The twenty-seven nations of Europe labor under trade restrictions imposed by every conceivable kind of barrier at the frontier; and when European publicists envisage a United States of Europe, they have in mind the freedom of trade in the United States of America. But in fact, our recognition of the doctrine of comparative advantage is limited. In every state is the endeavor to become self-sufficient in agricultural products. This is supported by the technical investigations, carried on in the state colleges of agriculture, to find strains of plants and animals suited to the local soil and climate. There is not only the urge to become self-contained (or less dependent); there is also the urge to increase the local population. Behind the reclamation movement stand the incentives of population growth and crop expansion. The obvious but unappreciated implication is that fewer states shall remain net importers and more states become net exporters. Apparently in each state the subconscious reasoning runs to the effect that, if a state produces more than it needs of any agricultural product and cannot sell the surplus to other states, an outlet can be found in the export market.

The surplus problem, as related to agricultural products, revolves largely about cotton, grain, and hog products. Their relative commercial and political impor-

tance is probably to be stated in the order named. The raising of wheat and cotton are more the expression of one-crop farming than in the case of hog products. The cotton and wheat belts have fewer additional cash crops than has the corn belt. The higher diversification of the corn belt tends to obscure the practical importance of the exportable surplus. The corn belt is a fairly homogeneous and compact region; wheat is divided into four regions which are competitive with each other; and cotton is divided into three regions (east of the Mississippi, west of the Mississippi, and the Pacific states) which present outstanding differences in social organization and agricultural practices. Wheat growing has a large element of frontier farming; cotton growing has the element of negro labor; the corn belt contains a high type of farm population. All in all, however, the export problem of the corn belt ranks in importance close to the export problems of wheat and cotton.

In the background of the production of corn, one must endeavor to define the surplus. Thereafter, one may undertake to measure the surplus. This is necessary both for consideration of the surplus of corn as a factor in agricultural distress in the corn belt, and also as the basis for any appraisal of tendencies in the future. To define the surplus of corn is difficult; to measure it exactly is impossible. But approximations over a series of years are possible even though in a single year the measurement is impossible.

It is advisable in discussions on surplus in agriculture to employ qualified terms. Supply and demand are equated in price; but, in turn, price influences both supply and demand. The factors influencing the prices and the uses of goods are so numerous that one must not set up absolute terms for production and consumption. On the one hand, one cannot question the occurrence of overproduction because the commodities do not pile up; goods

are dissipated in losses and wastes, put to degraded uses, and since it costs money to carry goods, the surplus is disposed of at a price. Nor must one urge underconsumption instead of overproduction because it is recognized that somewhere wants remain unsatisfied. A want, or a desire, is a different thing from an effective demand. We stand on safe ground, as well as in the clear, if we limit ourselves to the consideration of what may be termed the "operative surplus."

Every crop and commodity has a season. During the season there is an effective demand, a certain facility of distribution and salesmanship. Any production of the commodity in excess of the existing facilities of distribution and salesmanship represents for that season a supply beyond the effective demand—an operative surplus. No matter how small the proportion of houses installed with radios, whenever the outturn of radios is in excess of the existing facilities of distribution and salesmanship, there is a relative overproduction. Obviously, operative surplus arises more easily in connection with commodities for which the demand is inelastic than with goods for which the demand is elastic. Obviously, also, the operative surplus has a lesser meaning in dealing with a commodity for which the facilities of distribution and salesmanship are undergoing rapid improvement. The demand for wheat is relatively inelastic and the facilities for distribution and salesmanship of wheat are highly perfected and not susceptible of notable improvement from year to year; therefore, an operative surplus of wheat arises easily. The demand for radios is relatively elastic and the facilities for distribution and salesmanship are not highly perfected but are being rapidly improved; therefore, an operative surplus may develop less readily with radios than with wheat. If farmers will consider surplus production in a tangible, regional, and seasonal sense, as operative surplus rather than as surplus in the world-

wide relation of supply to demand, they will understand why, within a season, the prices of farm products are locally depressed at a time when circumstances in crops throughout the world might not seem to justify it.

The surplus of wheat may be defined as the exportable fraction of the crop, after adjustment for a reasonable carryover (as of July 1) of wheat on farms, in country mills and elevators, in visible positions in terminal markets, in city mills, and in the state of flour from mill warehouses to retail distributors. Each of these fractions of the carryover is subject to expansion or contraction; therefore, what may be termed a reasonable carryover of wheat is a range rather than a definite number of bushels or a proportion of the crop. Attractive export prices and promising new-crop prospects tend to make the carryover low; unattractive export prices and unpromising new-crop prospects tend to make the carryover relatively large. Farm use of wheat expands or contracts in response to prices and quality of wheat. With consumption by domestic mills relatively constant and appropriate adjustments made to comply with the requirements of a reasonable carryover, the exportable surplus represents the surplus of the wheat crop. For example, with mill grindings of 510 million bushels for domestic flour, seed requirements set at 80 million bushels, and other farm use at 50 million, out of a crop of 800 million bushels the surplus would be 160 million bushels, the figure being raised or lowered depending on whether the inward carryover were larger or smaller than the outward carryover. The situation with wheat is thus moderately simple in definition; the difficulties lie in the crop estimate, the grindings by mills, farm use, and the several fractions of the carryover.

With corn, no such comparative simplicity of definition exists; and the inaccuracies in all the figures are larger than with wheat. The figure for the total crop

cannot be regarded as better than a rough approximation. Accepting the crop estimate as basis of further computations, the crop is to be divided into merchantable and non-merchantable fractions. Assuming that only merchantable corn leaves the farm where grown (which is not strictly true, since some soft corn enters into local trade), this fraction of the crop is then divided into corn shipped out of the county where grown and corn remaining in the county where grown, specification by county being an arbitrary but convenient classification. During the nine crop years 1921-22 to 1929-30, about 79 per cent of the corn crop was classified as merchantable; of this, 23 per cent was shipped out of the county where grown, corresponding to 18 per cent of the entire crop.¹ The Department of Agriculture issues a report of old-corn stocks on farms on November 1. Corn shipped out of the county where grown may enter into visible trade or be otherwise disposed of. We possess fairly representative reports of corn receipts at ten terminal markets; visible supplies in terminal markets are reported for a large list of warehouses, whose number is however incomplete. The visible supply on November 1 is regarded as the carryover in terminal markets. Farm stocks on November 1, the visible supply on November 1, stocks in country mills and elevators, and stocks in city mills and corn-products factories represent roughly the carryover of corn into a new crop year. Of these, we possess figures for only corn stocks on farms and the visible supplies in terminal markets. Lacking figures for stocks in country mills and elevators, some idea of the position is perhaps to be secured from the reports of monthly marketings by farmers.

When, now, one regards the figures for the crop of corn and the export of corn,² it becomes clear that the export of corn does not at all correspond to the surplus

¹ See Table 7, p. 132.

² See Appendix Table VI.

of corn in the sense that the export of wheat corresponds to the surplus of wheat. Instead, it is obvious that from year to year a varying proportion of the surplus of corn passes into export; but from the figure for export, no inference can be drawn as to the figure for surplus. We import corn in some years of large crop and low prices; we export corn in some years of short crop and high prices; imports and exports are determined by conditions abroad as well as by circumstances in the domestic corn crop. Corn is one of a number of feedstuffs—the most important one, it is true; and the price of corn is influenced by prices and availability of the small grains and of various concentrates.

Probably, if farmers could agree on a figure for average cost of production of corn and if the supply of corn were so short that the price stood above the cost of production, it would be agreed that no surplus existed; but if the supply were so large that the price stood below the cost of production, it would be agreed that a surplus existed. In this sense the concept of surplus depends on the return for the crop, and the extent of the surplus would be reckoned from the depression of the price. The farmer does not think in units of demand but in numbers of cattle and hogs, prices of cattle and hogs, the corn-hog ratio, and the corn-cattle ratio. The grain merchant does not think in units of demand, but judges the surplus by the effort necessary to merchandise it and by the position of the price at which this is accomplished. But the reasoning of the farmer and the grain dealer is essentially the same as that of the economic commentator. It follows both from theory and from practice that the surplus¹ of

¹ J. D. Black, in his book on *Agricultural Reform in the United States* (New York, McGraw-Hill, 1929), p. 483, has condensed his view on surplus into the following excellent statement:

“The type of real surplus which is most serious is that which results from overplanting or overbreeding for a series of years—such as exists with sugar at present, probably also with rubber, wheat, and corn. The result of such a

corn is not a static item but a variable one; a large crop may have a small surplus and a small crop may have a large surplus. What counts is the price effect under the existing circumstances of the crop year.

In the practical sense, a surplus of a commodity may arise through substitution of another commodity. This is true of corn. To a substantial extent corn has been replaced in the American diet by other foodstuffs. In the manufacture of industrial alcohol corn has been replaced by molasses. When a vegetable oil replaces lard, this indirectly enhances the surplus of corn. We shall later find this aspect of the surplus question of considerable importance.

The surplus of cash corn has less meaning, involving only a small fraction of the total crop, and is regional rather than national. The real surplus of corn lies in the animal products, in proportion as corn participates with the other feedstuffs in animal husbandry. Surplus or shortage of corn on farms, except in a few regions, is related to animal husbandry rather than to corn grown for cash sale.

Under these circumstances, farmers try to define the surplus largely by the prices of corn and hogs, and by the rural carryover of corn. When the price of corn is relatively high and it moves freely, the crop is commonly regarded as without surplus, irrespective of the size of the crop. When the price of hogs is high, this provides an outlet for corn, quite irrespective of the size of the crop. If growers cannot sell the corn or feed it at prices regarded as remunerative but instead must carry over an unusual amount in the crib, this is regarded as a surplus, irrespective of the size of the crop. Naturally, ex-

surplus is a level of prices for the time being that will not support the growers of the product at their accustomed scale of living. Another type of surplus is that which may result any year as a result of favorable weather. A third type is that which happens every year with almost all farm products—the season surplus which must be carried till the consumers are ready for it.”

tremes of the crop have meanings. A crop substantially over 3 billion bushels indicates a surplus for the country as a whole, though there may be shortage in certain regions; a crop as low as 2.5 billion bushels indicates a shortage for the country as a whole, though there may be a surplus in certain regions. As we have stated, the real surplus lies not in corn itself but in the animals in which the largest fraction of the crop is marketed.

In a sense very real to the farmer, it might be said that as long as the trend of purchasing power of corn was rising, there was no surplus, no general oversupply relative to the demand; but when the purchasing power of corn declined, this indicated a surplus. This would imply no real surplus of corn in the forty years before the World War (apart from occasional bumper crops), but a practically continuous surplus since the war, even including the years of lean crops.

SURPLUS OF CORN AS DETERMINED BY ACREAGE OR YIELD PER ACRE

It is often sought to separate surplus due to extension of acreage from surplus due to yield per acre. Other things equal, the farmer might be held responsible for one but not for the other. The distinction, never too clear-cut with any crop, does not apply aptly to corn on account of the small proportion of corn sold as grain. Also, the wide extent over which corn is grown tends to reduce variations in crop due to variations in yield per acre and to modify their significance.

In Table 3 is found the order of events in the corn crop, being a tabulation in the order of increasing acreage, increasing production, and increasing yield per acre over the thirty crop years 1901 to 1930. Each of the series is divided into six groups of five years each, of ascending magnitudes.

Aside from the very exceptional year 1917, the acreage

TABLE 3.—UNITED STATES CORN ACREAGE, PRODUCTION, AND YIELD PER ACRE, ARRANGED IN ORDER OF MAGNITUDE, 1901-30*

Year	Acres (thousand acres)	Year	Production (million bushels)	Year	Yield per acre (bushels)
1903	90,661	1901	1,614	1901	17.0
1904	93,340	1930	2,094	1930	20.6
1905	93,573	1924	2,309	1924	22.9
1906	93,643	1903	2,347	1913	23.1
1901	94,636	1913	2,447	1911	23.9
Average	93,171	Average	2,162	Average	21.5
1907	94,971	1918	2,503	1918	24.0
1902	95,517	1907	2,512	1916	24.4
1908	95,603	1904	2,529	1914	25.8
1919	97,170	1911	2,531	1903	25.9
1929	97,856	1908	2,545	1909	26.1
Average	96,223	Average	2,524	Average	25.2
1909	98,383	1916	2,567	1917	26.3
1927	98,393	1909	2,572	1907	26.5
1926	99,615	1929	2,614	1908	26.6
1928	100,673	1902	2,619	1929	26.7
1924	100,863	1914	2,673	1926	27.0
Average	99,585	Average	2,609	Average	26.6
1925	101,302	1926	2,692	1904	27.1
1930	101,413	1905	2,749	1902	27.4
1920	101,699	1927	2,763	1910	27.7
1922	102,846	1919	2,811	1928	28.0
1914	103,435	1928	2,819	1927	28.1
Average	102,139	Average	2,767	Average	27.7
1921	103,740	1910	2,886	1915	28.2
1910	104,085	1906	2,898	1922	28.3
1923	104,324	1922	2,906	1925	28.8
1918	104,467	1925	2,916	1919	28.9
1916	105,296	1915	2,995	1912	29.2
Average	104,372	Average	2,920	Average	28.7
1913	105,820	1923	3,054	1923	29.3
1911	105,825	1917	3,065	1905	29.4
1915	106,197	1921	3,069	1921	29.6
1912	107,083	1912	3,125	1906	30.9
1917	116,730	1920	3,209	1920	31.5
Average	108,331	Average	3,104	Average	30.1

* Data from *Agriculture Yearbook, 1931*, p. 615, and *Crops and Markets*, September 1931, VIII, 347-48.

of corn varied during the period from 90 to 107 million acres. Aside from the very exceptional year 1901, the corn crop varied from 2,094 million bushels to 3,209 million bushels, with considerable fluctuation from year to year relative to the acreage. Aside from the year of exceptional crop failure, 1901, the yield per acre varied from 20.6 to 31.5 bushels per acre.

A scrutiny of the data in the table leads at once to the inference that the surplus of corn has been the expression both of acreage and of yield. This is made clear in Table 4, in which the average acreage in each of the six 5-year

TABLE 4.—HYPOTHETICAL CORN CROPS OBTAINABLE AT VARIOUS LEVELS OF ACREAGE AND YIELD PER ACRE*

Acreage (thousand acres)	Yield per acre (bushels)	Production (million bushels)	Acreage (thousand acres)	Yield per acre (bushels)	Production (million bushels)
93,171.....	21.5	2,003	102,139.....	21.5	2,196
	25.2	2,348		25.2	2,574
	26.6	2,478		26.6	2,717
	27.7	2,581		27.7	2,829
	28.7	2,674		28.7	2,931
	30.1	2,804		30.1	3,074
96,223.....	21.5	2,069	104,372.....	21.5	2,244
	25.2	2,425		25.2	2,630
	26.6	2,560		26.6	2,776
	27.7	2,665		27.7	2,891
	28.7	2,672		28.7	2,995
	30.1	2,896		30.1	3,142
99,585.....	21.5	2,141	108,331.....	21.5	2,329
	25.2	2,510		25.2	2,730
	26.6	2,649		26.6	2,882
	27.7	2,758		27.7	3,001
	28.7	2,858		28.7	3,109
	30.1	2,997		30.1	3,261

* Based on average acreages and yields in Table 3.

periods is multiplied by the average yield per acre of each of the six 5-year periods to give a series of hypo-

thetical crops. A corn acreage as low as 93 million acres would furnish a large crop at the average yield of the highest five years. An acreage of 99 million would give practically a 3-billion-bushel crop with the average yield of the highest five years. An acreage as low as 96 million would give a moderate but sufficient corn crop at a yield corresponding to the median. The average acreage of the last eight crops (1923-30) was 100.6 million acres. At the yield of the lowest five years, 21.5, the crop would be 2,163 million bushels; at the yield of the highest five years, 30.1, the crop would be 3,028 million bushels. At the median yield the crop would be slightly over 2,700 million bushels.

Obviously, with the acreage of corn planted since the war, one cannot speak solely of climatic effects. There were low yields in 1924 and in 1930. In several of the other years a slightly high yield of over 28 bushels to the acre augmented the surplus naturally to have been expected from the acreage. In the absence of unusual climatic disturbances it is clear that a reduction of acreage to something like 95 million acres would be necessary before it would be proper to insist on climate rather than acreage as determining surplus in the corn crop of the United States.

For hogs, there is of course no such thing as a climatic surplus, except in the indirect sense that a large corn crop in one year may tend to lead to expansion of the breeding program the following spring. When one realizes the extent to which the acreage of corn depends upon the number and price of hogs and the breeding of hogs upon the existing stock of corn, it follows that only to a secondary extent does the question of climatic surplus enter into the agriculture of corn and hogs. The adoption of the policy to aid corn growers when the surplus was of climatic character and not when due to extension of operations would in practice leave little to be done.

TENDENCIES MAKING FOR SURPLUS

Chart 2¹ leads to the inference that at some time in the future expansion of population may result in extinguishing what we now regard as the surplus of corn. But the time required is not foreseeable; and in the interval, factors are operating that for the time being make for continuation of, or even increase in, the surplus. In order to evaluate the probable trend, one must continuously bear in mind that the surplus of corn exists to a larger extent in the form of meat products than in the form of grain.

Two opposing trends exist in the production and disposition of corn (and other coarse grains as well). On the side of supply is the trend toward greater production per acre and still more toward increased production per operator. The first is due to selection of improved strains of cereals and perfected methods of cultivation; the second is due to replacement of horse-drawn seeders, cultivators, and harvesters by motor-drawn implements, whereby the acreage that may be handled by one man is greatly expanded. Other things being equal, these developments tend to stimulate corn acreage in the corn belt, as well as wheat acreage in the region between the Mississippi and the Rocky Mountains.

On the side of disposition are a series of developments tending in the direction of lessened utilization. The food and feed use of cereals has been declining. With each decade the number of bushels necessary to produce the average hundred pounds of live hogs and cattle is being reduced. Horses and mules are being replaced by tractors; many farmers sell horses and buy tractors, but keep on planting the same acreage of oats and corn; thus, they have oats and corn to sell and gasoline to buy. In short, while it is being made easier for the farmer to raise corn and the

¹ See above, p. 46.

other coarse grains, domestic utilization of coarse grains is relatively declining.

The net result of these observations leads to the inference that the effect of increase of population on the surplus of corn is in part, for the time being perhaps entirely, nullified by declining per capita utilization of corn. Though the surplus of corn may sometime be extinguished by growth of population, it will continue for many years, unless the acreage is reduced.

SUMMARY

For many decades corn has maintained a relatively constant position in American agriculture. The new lands taken into farms since 1900 have contained less soil particularly adapted to corn than the land entering farms between 1870 and 1900; but against this, the geographical range of corn growing has been extended by breeding and selection of improved varieties. The area now planted to corn is close to 100 million acres. This is not a limit imposed by soil, climate, or methods of cultivation; it is the expression of crop rotation and restriction of outlets. Annual fluctuations in the corn crop are more the results of variations in yield than in acreage; but the trend is due quite as much to acreage. The per capita acreage of corn and the per capita production of corn have declined irregularly since 1880. These trends suggest that at some future time corn may become a crop raised solely for domestic needs; but the time is not near and may not come to pass if the population becomes stationary at, let us say, 150 million.

With decline in number of work animals, nearly half of the corn crop is now fed to hogs; probably 90 per cent of the corn goes to animals. Excluding seed, close to 85 per cent of the crop is used on farms. Corn used for food and as industrial raw material and exported represents

hardly more than 10 per cent of the crop. Corn has never been so closely tied up with hogs as at present.

The surplus of corn is difficult of definition and impossible of measurement. Unlike wheat, the carryover and export of corn cannot be used to measure the surplus. With decline of export of corn (as grain) to insignificant proportions, the surplus of corn goes into animal feed-stuffs. Growers of corn judge the surplus by the price of corn and the carryover on the farm, and there is probably no better definition.

It is difficult to determine whether there is a trend in the surplus of corn. Operating in the direction of diminution of surplus are increase in population and in industrial utilizations of corn. Operating in the direction of increase of surplus are the declining per capita use of corn as food, the reduction in number of work animals, increased efficiency in feeding of corn, reduction in brewing and distilling, and increase in yield per acre and per man, through use of improved strains and perfected machinery. Increase or decrease in cattle, hogs, or sheep has an obvious effect on the surplus of corn. The cumulative effect of the factors making for increase in the surplus seems sufficient, for the time being, to overcome the influence of increase of population. Apparently, therefore, the surplus of corn is persisting; and within the next few years, increase in the surplus is not impossible under favorable climatic conditions.

CHAPTER III

HOG PRODUCTION AND DISPOSITION IN THE UNITED STATES

Introduction—Number of hogs: The hog cycle—Disposition of the hog crop—Slaughter of hogs—Objectives of swine husbandry—Corn-hog ratio: Interdependence of corn and hogs; The value ratio; The conversion ratio—Definition and measurement of surplus of hogs—Contrast between animal and vegetable fats and oils—Tendencies making for surplus—Factors working against surplus—Summary

INTRODUCTION

Hogs contribute the most valuable meat crop in the United States, second only to milk as a source of farm income from animal products. In the corn belt the value of marketed hogs exceeds the value of marketed milk. The farm value of the total estimated hog slaughter has averaged during 1922-30 about 1.5 billion dollars. The number of hogs on the first of January has varied from 54 to 72 million since the war. The hogs in the world are probably over 300 million, the census being insecure in many countries, especially in China and Russia. Of the total number of hogs in Europe and the Western Hemisphere, about a third are in the United States, with Russia second and Brazil or Germany third, followed by France, Poland, and Denmark.¹ Hogs thrive best in cold or temperate climates and have increased in numbers as pastoral agriculture has developed into the agriculture of planted crops. The hog has long been outstanding as a source of edible animal fat; in some countries hogs lead cattle as producers of edible protein, in other countries cattle take the lead.

¹ Cf. a recent summary of production and trade in the world by Kurt Ritter, "Die Schweinehaltung der Welt und der Handel mit ihren Erzeugnissen," *Berichte über Landwirtschaft* (Berlin, 1931), 41, Sonderheft.

NUMBER OF HOGS

The corn belt, agriculturally defined, cannot be traced along state lines. The corn belt (by states) in the broad sense includes Ohio, Michigan, Indiana, Wisconsin, Illinois, Missouri, Iowa, Minnesota, South Dakota, Nebraska, and Kansas, and contains about 70 per cent of the hogs of the country. The corn belt (by states) in a narrow sense includes Ohio, Indiana, Illinois, Iowa, and Nebraska. During the five years 1927-31, of the total estimated hogs on farms in the country, about 45 per cent were in this east-to-west string of states. Iowa is the center of the corn belt in units of intensive husbandry.

The production of hogs is not determinable by any single method but only by a combination of three sets of data: the number of swine, the slaughter of hogs, and the record of weight of dressed carcasses. Each of these has defects and the results are not properly comparable over any considerable length of time.

In Table 5 are given the figures for estimated numbers of swine on farms, and on farms and elsewhere, since 1881. With each decade the swine on farms have increased relatively until they now represent a very high proportion of the total number; swine are declining in forests and on ranges and are gradually disappearing from country towns. Comparing the ten years before the war with the past ten years, one observes that the proportion of hogs outside of farms is almost constant; this is a spurious concordance, depending upon the use of a ratio instead of an enumeration, and it is not to be believed that the number of hogs in villages has a constant relation to the number of hogs on farms. Swine husbandry is very unevenly distributed over the country. As scavengers and for home slaughter, hogs are kept in all parts of the country; the commercial husbandry of swine is largely concentrated in the corn belt.

An official estimate of swine gives the reported num-

TABLE 5.—TOTAL NUMBER OF HOGS IN THE UNITED STATES
ON JANUARY 1, 1881-1931*

(Thousands)

Year	Hogs on farms and elsewhere ^a	Hogs on farms ^b	Year	Hogs on farms and elsewhere ^a	Hogs on farms ^b
1881.....	53,100	36,248	1906.....	56,489	54,600
1882.....	62,900	44,122	1907.....	59,283	57,300
1883.....	60,000	43,270	1908.....	63,421	61,300
1884.....	59,600	44,201	1909.....	58,972	57,000
1885.....	59,300	45,143	1910.....	50,588	49,300
1886.....	58,900	46,092	1911.....	57,627	55,700
1887.....	55,500	44,613	1912.....	57,627	55,700
1888.....	53,600	44,347	1913.....	55,868	54,000
1889.....	59,200	50,302	1914.....	53,592	51,800
1890.....	59,100	51,603	1915.....	58,972	57,000
1891.....	59,400	50,625	1916.....	61,766	59,700
1892.....	62,900	52,398	1917.....	58,662	56,700
1893.....	56,700	46,095	1918.....	63,318	61,200
1894.....	57,000	45,206	1919.....	66,007	63,800
1895.....	57,000	44,166	1920.....	62,597	59,959
1896.....	56,600	42,843	1921.....	61,180	58,602
1897.....	55,000	40,600	1922.....	62,179	59,559
1898.....	55,100	39,760	1923.....	72,082	69,044
1899.....	54,900	38,652	1924.....	69,281	66,361
1900.....	54,418	52,600	1925.....	58,013	55,568
1901.....	55,041	53,200	1926.....	54,443	52,148
1902.....	48,419	46,800	1927.....	57,199	54,788
1903.....	48,833	47,200	1928.....	63,028	60,617
1904.....	51,213	49,500	1929.....	59,821	57,410
1905.....	53,799	52,000	1930.....	55,649	53,238

* Data from *Agriculture Yearbook, 1931*, p. 843.

For January 1, 1931, the number of hogs on farms and elsewhere was estimated as 55,734 thousand and hogs on farms as 52,323 thousand.

^a Data prior to 1900 estimated by Bureau of Animal Industry. Census figures prior to 1920 adjusted to a January 1 basis and to include all ages and all animals in towns, villages, and ranges, as well as on farms. Figures since 1900 are estimates of the Bureau of Agricultural Economics of swine on farms plus an estimate of the Bureau of Animal Industry of swine in towns and villages.

^b Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as based on first report after census data were available; 1900-19 are tentative revised estimates of the Bureau of Agricultural Economics.

ber on the date of census, not the number (maximum, minimum, or mean) existing during the year. Usually

the report is dated January 1, though we have several times had reports dated June and April. January and July are low months for farrowing; January is a high month for marketing, July is low. Since the relations of spring and fall farrowing vary, no constant seasonal curve for number of hogs exists. Since only one report per annum is practicable, the customary date of January 1 is probably the best, and, since comparability is important, this date should be adhered to. In the use of the estimates of numbers of swine, it is to be kept in mind that year-to-year fluctuations in numbers on January 1 need not imply corresponding fluctuations in births, in total numbers during the year, or in slaughter.

The count of swine reported in the decennial census is fairly intended to approximate an enumeration. Each year the Bureau of Agricultural Economics issues an estimate of number of swine on farms based on field reports. Considerable discrepancy may appear between the hog count reported in the census and the corresponding estimate of the Bureau of Agricultural Economics. In 1920 the report of the census was 59,346 thousand hogs, that of the Bureau was 59,959 thousand; in 1925 the report of the census was 50,854 thousand, while that of the Bureau was 55,568 thousand; in 1930 the (preliminary) census report was only 32,797 thousand (?), whereas that of the Bureau was 53,238 thousand. The annual estimates between decennial censuses are essentially adjustments based on local reports. Any bias in the successive annual estimates tends to result in a progressive deviation from the true trend. Each successive decennial census provides a new base-line. In the annual estimate it is apparently assumed that the seasonal curves of births, deaths from other causes than slaughter, and marketing for slaughter are constant and comparable year after year.¹ This, obvi-

¹ What would be really informative, if practicable, would be annual reports on births, deaths, age distribution, breeding stock, and marketing.

ously, is far from true, since the proportions of farrowing in spring and fall are not constant, deaths from neglect and disease vary widely from year to year, and the course of marketing varies substantially. Finally, something corresponding to the weight per bushel in the case of a grain is implied, which cannot be true, since the age distribution in the swine population varies from year to year, and body weights rise and fall with availability and price of feedstuffs. With these various qualifications, one can set up each year a ratio of human population to swine population—the annual estimate of human population itself conjectural—and secure a figure for per capita supply of live hogs which becomes less secure in each successive year following the decennial census.

Appendix Table I contains the figures for per capita hog supply based on the census of population and of swine. From these data we learn that the per capita supply of hogs has declined about one-half during fifty years. This decline is strikingly illustrated in Chart 2,¹ where the per capita hog supply is plotted on the logarithmic scale. If one will compare this curve with the curve for the corresponding decline in per capita corn acreage and per capita corn supply, it will be observed that the decline in per capita hog production is much the more pronounced.

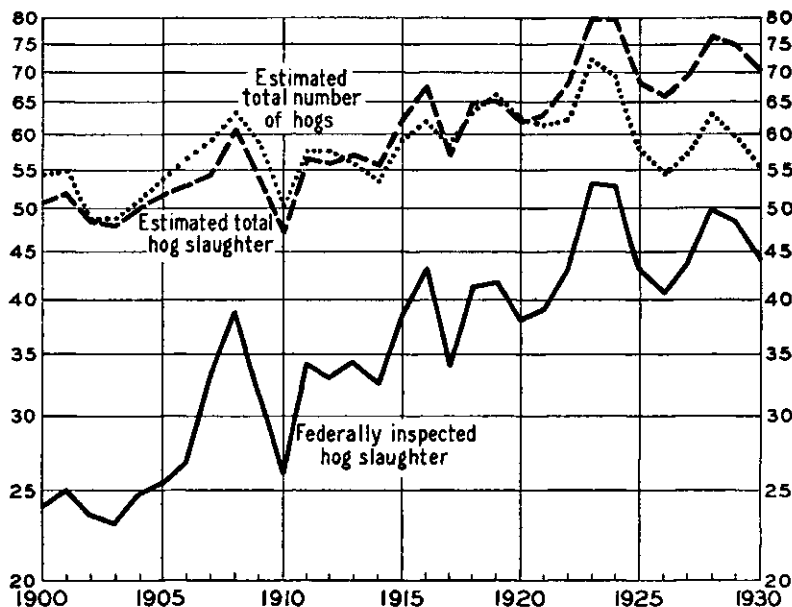
THE HOG CYCLE

It is recognized that hog production follows a cycle. The cycle is not natural or inherent, but it is none the less significant. In Chart 3 the estimated number of hogs on January 1 and the slaughter during the succeeding calendar year are plotted on the logarithmic scale. The chart illustrates both the secular trend and the cyclical fluctuations. As exception to the rule, the number of swine

¹ See above, p. 46.

CHART 3.—ESTIMATED TOTAL NUMBER OF HOGS IN THE UNITED STATES, ESTIMATED TOTAL HOG SLAUGHTER, AND NUMBER SLAUGHTERED UNDER FEDERAL INSPECTION, 1900-30*

(Millions of hogs; logarithmic vertical scale)



* Based on data in Appendix Table II.

may remain relatively constant for nearly a decade, as was the case following the year 1893.¹

These cyclical fluctuations are not regular in duration or interval; they are irregular in height and depth. For the most part, the hog cycle depends upon the corn-hog ratio, to be discussed later in this chapter.² The irregu-

¹ A cycle occurs in cattle prices with peaks about every fifteen years; a sheep cycle occurs every four or five years. Beyond the mere mention of it, we do not intend to examine these cycles. Interested readers will find in *Wallaces' Farmer* of April 12, 1930, p. 5, a chart illustrating the purchasing power of beef cattle per head over the past fifty years.

² Cf. also Chart 5 on page 94.

larities are what are to be expected when one considers that hog cycles are due to human factors and depend on motivated variations in breeding operations.

Just as there are three kinds of corn farmers (those who raise corn to sell, those who raise corn to feed, and those who also buy corn to feed—naturally these overlap), so there are three kinds of market-hog farmers (those who raise hogs to sell unfinished, those who raise hogs to finish, and those who buy feeder hogs to finish—naturally again with some overlapping). For the most part in the corn belt, hogs are raised by farmers who intend to finish them for the market; nevertheless, the sale of feeder hogs in the principal markets indicates that the finishing of such animals, like the finishing of range cattle and lambs, is a large and probably a growing business. The three classes have not the same interests in corn and hog prices and interpret somewhat differently current prices for feeds and for hogs, and prospective prices for hogs and for cattle and sheep.

Farmers handling hogs, especially those who finish for the market the hogs they raise, fall into one of three classes in adapting their practices to current prices. The farmers of one group practice a diversified agriculture in accordance with their views of farm management, with a fairly uniform acreage of corn and other crops year after year, and a corresponding uniformity in animal husbandry, modified only slightly or not at all by current prices of plant crops or animals. Accompanied by good management of cattle, dairying, sheep, and poultry, this long-term view of hog raising suits many farmers because it maintains soil fertility. Such farmers miss having a large drove of hogs in a year of high prices, but they also miss having a large drove of hogs in a year of low prices.

A second group of farmers are shrewd opportunists and modify their breeding and finishing operations along individual lines. The farmers in this small group have

larger droves to sell in years of high prices and smaller droves in years of low prices.

In the third class are the majority of farmers, who, through shortsighted misinterpretation of prices and conditions, breed and finish an oversupply of hogs at one time and an undersupply at another time. This mistake is made largely through misuse of the corn-hog ratio. The result is the hog cycle, large supplies being associated with low prices and low supplies with high prices. Extreme cycles are not observed with cattle and sheep—with cattle largely because breeding operations are too slow, with sheep largely because of the restraining influence of the price of wool and the low rate of reproduction. In the case of hogs, the several elements and attributes make for ease of variation, and the hog cycle is the result.

DISPOSITION OF THE HOG CROP

The hog crop is disposed of as follows: slaughter under federal inspection; slaughter outside of federal inspection (with or without local inspection) outside of farms; and slaughter on farms, with or without inspection. The relative volumes of slaughter are shifting in favor of slaughter outside of farms. Broadly considered, there seems to be a tendency toward decentralization, but this applies mostly to plants under federal inspection. It is especially hog products prepared under federal inspection which influence live-hog prices and have the largest bearing on cash income in the corn belt.

There is no feasible separation of the edible from the inedible fraction of the hog crop. The inedible slaughterhouse products of the hog (hide, tankage, fertilizer, etc.) are relatively much less important than those of cattle and sheep. The division of the edible products into fresh and cured (or otherwise processed) products may be approximated on the basis of packing-house reports.

SLAUGHTER OF HOGS

The report of animals slaughtered under federal inspection, together with estimates of slaughter outside of federal inspection, was established in 1907. For the two previous decades we have only the reports of the census. Appendix Table II contains the available data from 1900 to date. The ratios of hogs slaughtered to the swine count are given in Appendix Table II for the years since 1900. Too much reliance is not to be placed on these ratios because they contain errors in the estimate of farm slaughter and the assumption that the January 1 count of hogs, year after year, is comparably representative of the total number. But with due qualification, the continuous and persistent increase in the ratio during three decades remains significant. It indicates a more rapid turnover, a better utilization of the breeding stock, and is a sign of increasing efficiency in hog production.¹

When demand and supply are equated in price, at the same time that price influences both demand and supply, the validity of appraisal depends mainly upon the measurement of supply. Supply must be measured before demand can be studied, and the measurement of supply is a purely technical procedure. To an extent not at all adequately appreciated, the annual supply of hog products is assumed rather than measured, and this despite the importance of the husbandry of swine in the national economy. The exact relations must be made clear; otherwise one does not appreciate how insecure is the procedure of trying to measure the surplus of pork and lard when the gross supply is not directly measurable.

The annual supply of hog products is not to be computed from the annual estimate of number of swine; it requires a direct statistical determination. For this pur-

¹ In Appendix Table XXI are the data on amounts and values of hogs slaughtered under federal inspection, by months, since November 1909.

pose we utilize the census of slaughter. Unfortunately, the data on hog slaughter were in a situation of confusing insecurity until the last census. There are four separate and recognized types of slaughter of swine: wholesale, custom, retail, and farm slaughter. Wholesale slaughter was reported in the censuses of 1899, 1904, and 1914 and in the biennial censuses since 1919. Custom slaughter was reported in the censuses of 1914 and 1919, but not otherwise. Retail slaughter was reported only once, in the census of 1909. Farm slaughter has been reported twice—in the census of agriculture in 1909 and in 1919. The fifteenth decennial census includes reports on wholesale slaughter, custom slaughter, retail slaughter, and farm slaughter. This provides us with a new baseline, containing, for the first time, reports on all kinds of slaughter of swine.

Since the establishment of federal inspection of slaughter in 1907, we possess annual reports of slaughter of swine under federal inspection, which are almost equivalent to enumerations. Also, through the United States Department of Agriculture, reports are issued monthly and annually on dressed weight, edible offal, lard production, and other items. The information on swine slaughtered under federal inspection is apparently reliable, and if there were no slaughter of swine outside of federal inspection it would provide a satisfactory basis for measurement of the supply of hog products. But, as was indicated above, a large proportion of hogs killed are slaughtered outside of federal inspection.¹

The United States Department of Agriculture issues annually a mimeographed report on *Statistics of Meat Production, Consumption, and Foreign Trade of the United States*. The original series extended back only to

¹ For an appraisal of the statistics of slaughter, see L. B. Zapoleon, *Inedible Animal Fats in the United States* (Fats and Oils Studies of the Food Research Institute, No. 3, December 1929), pp. 154-74.

1907 (when federal inspection was instituted) but has been computed back to 1900. Estimates of total slaughter are based on the annual records of slaughter under federal inspection, the ratio of such slaughter to all other slaughter in the years when a census of other slaughter was taken, and such other data as are available. The ratio has been inherently uncertain, particularly since it has not been revised on a new base-line since 1909. Just what bias was contained and what deviation has developed, it is impossible to say. The ratio is not susceptible of demonstrable adjustment or correction by such field studies as have been found possible. If one will compare the number of swine reported slaughtered under federal inspection with those estimated as slaughtered outside of federal inspection, it will be observed that slaughter of hogs under federal inspection has increased and slaughter outside of federal inspection has declined, with a relatively large fluctuation from year to year. This is what ought to be expected; but the plus-and-minus error in the estimate of swine slaughtered outside of federal inspection must be large, and the indefiniteness of the figure is all the more significant when one recalls that according to these tabulations about one-third of the hogs assumed to be annually slaughtered for food are killed outside of federal inspection. The recent census ought to provide a corrected estimate.

A direct approach to the study of hogs slaughtered outside of federal inspection is not now possible. Swine killed outside of federal inspection may be slaughtered under state inspection, under county inspection, under municipal inspection, and without inspection. Farm slaughter is done practically without inspection; also, it is clear that considerable wholesale slaughter for intrastate trade, custom slaughter for intrastate trade, and especially retail slaughter are done without inspection, or under nominal inspection not worthy of the name.

We are not here concerned with the sanitary aspects of slaughter of swine outside of federal inspection; we wish merely to insist that we have available at this time no statistical approach to the study of swine slaughtered outside of federal inspection.

In the annual report on meat production issued by the Department of Agriculture, the swine slaughtered are converted into dressed weights and outturn of lard. The edible offal is disregarded, or rather it is assumed to offset the inedible parts of the carcass. It is assumed that the live weights, dressed weights, and lard reported for hogs slaughtered under federal inspection apply to hogs slaughtered outside of federal inspection. It is implied that a farmer finishing hogs has them all of the same type and in the same condition, and that the animals he sells to the butcher in the village, to the small intrastate packing house, to drovers, and those he kills for the use of his family correspond with those he sells for slaughter in the large packing houses operating in interstate trade under federal inspection. This assumption is not to be granted, because it is in contradiction with common knowledge of farm practice. The farmer sells on the basis of relative prices for different classes and weights and inclines to slaughter for farm use, or sell for neighborhood use, the hogs that would fetch the least in the terminal market. In short, to the assumption of the number of animals slaughtered outside of federal inspection are added further assumptions as to their live weight and dressed weight.

Finally, the separation of dressed weight, excluding lard, from lard produced is arbitrary. In the commercial slaughter of hogs the empty carcass which is weighed to give the figure for dressed weight is freed of all thoracic and abdominal viscera; when hogs are cut up directly after slaughter, the weights are computed to the same basis. On the other hand, the figure for "dressed weight"

in the reports does not mean the bare weight of the dressed carcass—it means that weight minus a computed figure for lard later rendered from parts of that dressed carcass. It is the intention in the tables to show the different kinds of meat from the dressed standpoint, thus excluding the offal, edible and otherwise, and there is also excluded that part of the carcass which is converted into lard. Therefore, the figure for pork comprises only the meat portions of the dressed carcass disposed of as fresh, canned, cured, etc., while the figure for lard is intended to include all lard produced from the hogs. But this procedure is practicable, if at all, only for large packing houses. One large fraction of lard comes from the offals, this including the leaf lard; another fraction arises when the carcass is cut for processing and curing; another fraction is obtained when backs and sides of low-grade or heavy hogs are rendered rather than cured; another fraction is obtained from the cuttings and trimmings in the retail shops which are supplied with carcasses slaughtered by large packers under federal inspection; finally, another large fraction, of which there can be no record, proceeds from hogs killed outside of federal inspection. These several fractions cannot be taken into equitable account in the tabulation of lard produced in the report of the Department of Agriculture. What is really presented in the report is the assumption that the lard produced in packing houses curing bacon and hams for interstate trade is representative of the entire slaughtering industry, including retail slaughter and farm slaughter.

The figures thus obtained are, however, the best we possess for the domestic supply of hog products. Adjusted for imports and exports, the annual figures for hog products thus secured, divided by the annual estimate of the human population, furnish the estimates of per capita consumption of pork (excluding lard) and of lard in the

United States. These figures are stated in decimals of a pound, when certainly the approximation cannot lie in a smaller unit than the pound, and in our judgment the possible and probable plus-and-minus error for pork may be several pounds per year.

Looking over the figures in the series (Appendix Table IV), one observes over the three decades wide and erratic fluctuations. Whether fluctuations represent variations in consumption from year to year or are the consequence of bias, variations, and errors in the methods of computation, is not determinable. Probably both are involved to a varying but indeterminate extent. We are convinced, from the published data relating to the supply of hog products, that, in view of the procedures by which the data are compiled and the assumptions contained in the interpretation, no inferences are to be drawn in respect to consumption from year to year or of a trend in consumption over the three decades.¹ It is significant to observe that the annual variations in gross domestic supply of animals and their outturns that are subject to statistical qualification and question approximate or exceed the exports from the United States in recent years.²

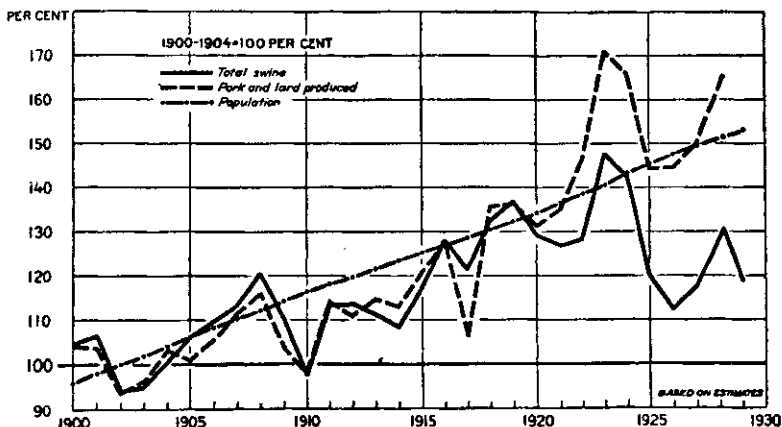
Of particular interest is the relation between population, swine on farms, and outturn of pork and lard, presented in Chart 4. It is to be observed that production of pork and lard followed the same trend as swine on farms until after the war, when the two lines began to diverge, indicating an increased outturn of pork and lard per head of swine on farms. This is the result of increased efficiency and other factors to be discussed elsewhere.

Farmers tend to feed hogs to heavier weights when corn is cheap and market them at lighter weights when corn is dear. Also, when breeding stock is marketed,

¹ See chapter viii.

² For a more detailed discussion of certain points, see L. B. Zapoleon, *Inedible Animal Fats in the United States*, chapter viii.

CHART 4.—SWINE ON FARMS ON JANUARY 1, COMPARED WITH PORK AND LARD PRODUCED AND POPULATION, IN THE UNITED STATES, 1900-29*



* Reproduced from O. E. Baker, *Do We Need More Farm Land?* (mimeographed publication of the Bureau of Agricultural Economics of the U.S. Department of Agriculture of address made by Dr. Baker before the Agricultural Extension Conference, University of Minnesota, St. Paul, Minnesota, December 13-14, 1928).

heavy weights appear. Probably the heavier weights of recent years are in part the reflection of increased efficiency in feeding. Other things being equal, to a considerable extent hogs (especially barrows) are marketed at a certain age and in a certain month, rather than at a particular body weight. A hog of eight months fed according to modern practice is considerably heavier than a hog of that age fed according to the practice of twenty years ago. With the heaviest farrowing in March and April and the heaviest market receipts in December and January, increased efficiency in feeding would lead to a heavier average weight at slaughter. Perhaps as important as heavier weight is the effect of larger litters on out-turn of marketed hogs.

OBJECTIVES OF SWINE HUSBANDRY

The hog drove does not lend itself to one-crop farming; swine husbandry implies diversified agriculture. The outstanding objectives of swine breeding have been fecundity, uniformity of type, and efficiency in converting nutrients into body substance. Quality considered, the larger the litter of pigs of uniform type brought to market maturity, the earlier the age of market maturity, and the lower the amount of nutrient required, the more remunerative the operation.

The wild hog, on account of the exigencies of a defensive existence and the nature of its diet, was a lean animal. Without extending the comparison to anatomical conformation, it may be said that the wild pig was the original bacon-type hog. The primitive peoples needed fats and the earlier efforts in hog-breeding evolved fat swine; thus, gradually appeared what is known as the lard-type hog.

The notion that the lard-type hog originated from corn feeding is incorrect. Early Chinese hogs were fat types. According to the English literature, for example from 1700 on, breeders strove for size, which meant fat. In Sidney's book on *The Pig* (published in 1860), it was remarked that the Large Yorkshire came slowly to maturity and could be fed up to 800 pounds weight. At that time, the average weight of the Berkshire hog, conforming to public taste in Great Britain, was around 400 pounds. Today in Great Britain the preferred weight of the "porker," to be used fresh, is around 120 pounds, and of the bacon pig, around 200 pounds. In general, the trend has been the same on the Continent.¹

The change was the result of a series of factors whereby the hog, instead of being mainly a source of fat,

¹ A review of the similar development in Germany is to be found in Max Sering, "Die Deutsche Landwirtschaft," *Berichte über Landwirtschaft* (Berlin, Paul Parey, 1932), Neue Folge, 50, Sonderheft, pp. 466-72.

became more important as a source of meat (protein). Let us say a 450-pound hog contains around 240 pounds of fat and 36 pounds of protein and a 150-pound porker around 60 pounds of fat and 18 pounds of protein. When the London market has three carcasses of 150 pounds each instead of one carcass of 450 pounds, it secures 54 pounds of protein and 180 pounds of fat instead of 36 pounds of protein and 240 pounds of fat. These figures are arbitrary and approximate, but they are representative for purposes of illustration. On the basis of nutritional equivalents in the feed, the production of the 150-pound porker is more efficient than that of the 450-pound hog; but the change has been brought about by consumer demand rather than by expert opinion.

There are several factors involved in this change in public demand. Broadly considered, it seems due mostly to diversification in supply of available fats and oils. Through breeding and selection, the milk secretion of cows has been greatly increased; the manufacture of butter and cheese has been improved and their dispatch from country to country facilitated. Many vegetable oils have been introduced and made freely available through developments in technique and in international trade. There has been some decline in culinary esteem for carcass fats—lard, beef tallow, and mutton tallow. The change in taste extends not merely to the expressed fats, but also to the meat cuts; almost everywhere in public eating-places and homes taste inclines to small and lean cuts instead of large and fat cuts. This implies younger animals brought to slaughter at lighter weights instead of older animals brought to slaughter at heavier weights, and the difference is predominately in fat and not in protein.¹ Consider the use of so-called mess pork in the United States fifty years ago and today. "Sow belly," pre-

¹ Compare baby beeves versus 3-year-old steers, lambs versus wethers.

pared and served straight, was a staple foodstuff up to the close of the last century; nowadays it is mostly used as an unmentioned flavoring for vegetable dishes. With the decline of "sow belly," cured bacon has correspondingly increased in popularity. Alongside of lard, lard substitutes prepared from vegetable oils are now widely used. Fluid vegetable cooking oils—olive, cottonseed, corn, peanut, soya, palm, and coconut—find increasing favor, more or less the world over.

With the development of breeding of purebred swine in the United States after the Civil War, our standards were naturally a counterpart of those of Great Britain. The brood stock brought over from Great Britain was predominately of the larger type. The Chester White was an American breed of heavily fattening type. The Poland Chinas were large animals, as were the Duroc Jerseys. Up to the beginning of this century, the so-called bacon type, of which the Tamworth is perhaps the best illustration, found little favor with American breeders or producers.

In western Europe, under the price influence of the preferred types of bacon, lard-type hogs have been largely superseded by bacon-type hogs. Several decades ago, under the leadership of the experts, hog raising in Canada was shifted from the lard type to the bacon type, a transition facilitated by the shortage of corn among the domestic feeds. With expansion of hog raising in other British dominions, such as New Zealand and South Africa, the bacon-type hog is preferred; the movement is less in evidence in the Danubian basin.

In the United States, however, the lard-type hog has maintained its pre-eminence, largely on account of the availability of corn. The corn production is the first step, and the farmer gets rid of his corn by converting it into heavy hogs. Bacon-type hogs can be finished with corn as the only cereal in a properly selected ration; and corn

is fed in mixed grain rations to bacon-type hogs all over northwestern Europe. Also, lard-type hogs of good quality and conformation (brought to slaughter as high-grade butcher hogs at six months of age and weighing 200 pounds) furnish excellent raw material for cured ham and bacon. But barley and rye tend to make exceptionally firm pork; and in the absence of supplementary concentrates, barley and rye make leaner pork and firmer fat than corn. Feeder pigs, brought from pasture and finished on corn exclusively, do not yield the conformation needed for superior bacon. The general run of lard-type hogs, fed according to the prevailing practices and finished on corn for three or four months, furnish heavy animals of coarser quality, with excessive fat. The price of such hogs is nearly always lower, and often greatly lower, than the price of lighter-weight butcher hogs. The trimmings in the cutting room are heavier, more lard has to be rendered, the heavy hams and shoulders grade low, the bellies must be marketed as salt pork instead of smoked bacon, and the salted ribs and backs are heavy and sometimes bring little more than lard. Despite the price penalties inflicted on American hog raisers by the preference for bacon-type hogs in the export market and by the popularity of lean pork and vegetable lard substitutes in the United States, American hog raisers still incline to produce fat instead of lean.¹ Of this tendency a good market illustration lies in the experience that the corn-hog ratio has always been computed on the price of heavy hogs, since these were regarded as the most representative animals. Now it seems obvious that so long as heavy hogs are the representative hogs in the United States, while the consuming public prefers lean to fat,

¹ In the hands of some husbandmen the lard-type hog is being modified to produce an intermediate type that at 200 pounds makes a high-grade butcher hog for domestic demand, equal to a bacon-type for everything but Wiltshire-side type of curing.

live hog prices will continue, other things equal, to reflect the relatively low prices of lard, salt fat pork, and heavy hams and shoulders.

CORN-HOG RATIO

Broadly considered, hogs are condensed corn. Corn has around 6-8 per cent of protein, 70 per cent of carbohydrate, and 4 per cent of fat. The body of a small hog contains perhaps three times as much fat as protein; a medium-weight hog contains probably five times as much fat as protein; a heavy hog may contain eight times as much fat as protein. When it is recalled that fat has 2.2 times the heat value of protein, the predominance of fat in terms of energy is clearly revealed. Since the edible part of the hog contains ten (or more) times as many fat calories as protein calories, in effect the body of the hog represents a transformation of corn—that is, broadly stated, the protein content is about the same in each, while the fat content of the hog equals the starch and fat content of the corn. In short, condensing corn into hogs is essentially conversion of corn starch into hog fat.

Using the best available data, the edible hog supply of the United States contains at least five parts of hog fat to one part of hog protein. Thus, in hog production of the current type, five parts of fat are produced for one part of protein. Converted into calories, this means that the fat in the hog supply contributes to the food supply more than ten times the calories contained in the protein in the hog supply.

Protein is a high-priced, indispensable nutrient; fat is a low-priced, relatively dispensable nutrient. Hog protein competes with other high-priced protein; hog fat competes with other low-priced fats and oils. The proportion of the high-priced protein in the hog supply is relatively small; the proportion of the low-priced fat in the hog supply is relatively large. Thus, from the stand-

point of both price and volume, it is natural to find that the problems of the corn belt are related to hog fat more than to hog protein.

When one considers the relations of protein and fat in the hog crop, in the American diet, and in American hog exports, it becomes clearer why the problems of the corn belt are centered around hog fat. This is both natural and inevitable, because hog fat is the predominating final product of the corn belt. The critical price problems of swine husbandry are centered in corn and in hog fat, and these price problems include production, manufacture, distribution, and consumption.

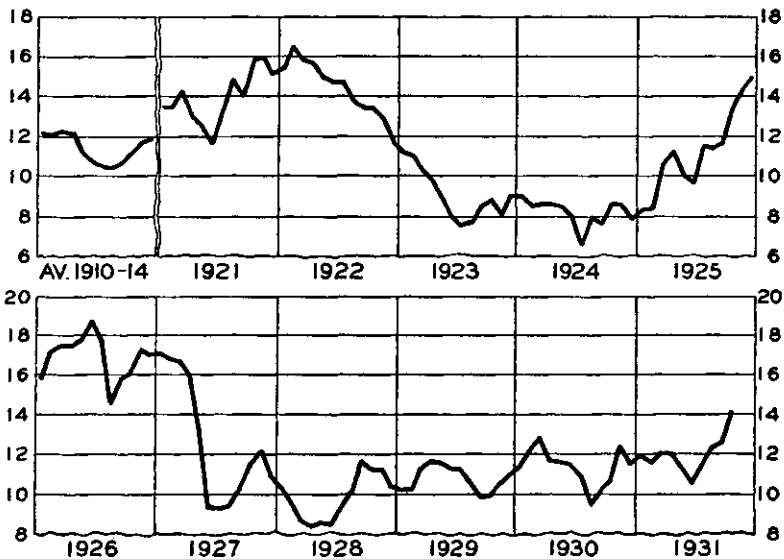
INTERDEPENDENCE OF CORN AND HOGS

The corn-hog ratio represents the number of bushels of corn the market value of which equals the market value of 100 pounds of live hogs.¹ It is the quotient obtained by dividing the farm or terminal price of a hundredweight of hogs by the corresponding farm or terminal price of a bushel of corn. As secured by the use of terminal prices, the corn-hog ratio as shown in the annual averages is relatively wide, from below 8 : 1 to above 18 : 1, with the average in a decade usually between 11 : 1 and 12 : 1. There is a seasonal movement of the ratio from month to month, corresponding to seasonal factors in the prices of corn and hogs: ordinarily, the farm ratio is seasonally lowest at some time during June–August; it is usually highest at some time during October–January. Monthly ratios, using farm prices of corn and hogs since the war, are presented in Chart 5.² These show the wide variations resulting from the interaction of seasonal and other factors. Since 1920 the monthly ratios have varied

¹ Cf. H. A. Wallace and E. N. Bressman, *Corn and Corn Growing* (New York, John Wiley & Sons, 1928), p. 279.

² Appendix Table XXV contains the corn-hog ratios (based on farm prices) for the five years before the war and since 1921.

CHART 5.—CORN AND HOG RATIOS, BASED ON FARM PRICES OF CORN AND HOGS IN THE UNITED STATES, MONTHLY, AVERAGE 1910-14 AND SINCE 1921*



* Based on data in Appendix Table XXV. The ratios represent the number of bushels of corn required to buy 100 pounds of live hogs.

from 6.7 : 1 in July 1924 to 18.7 : 1 in June 1926. The farm ratio is higher than the terminal ratio; a terminal ratio of 11.5 : 1 corresponds to about 13 : 1 in farm prices. The seasonal variation tends to be less pronounced in the farm ratio than in the terminal ratio.

The corn-hog ratio has been commonly employed as a device to judge the "product price" of corn, as distinguished from the cash price. Averaged over a period of years, it has thus been interpreted as a rough index of the cost of production of hogs. The point has been well stated by Haas and Ezekiel,¹ as follows:

¹ G. C. Haas and Mordecai Ezekiel, *Factors Affecting the Price of Hogs* (U.S. Department of Agriculture Bulletin 1440), November 1926, p. 21.

During the period 1896 to 1914, 11.4 bushels of corn were worth as much on the Chicago market, on the average, as were 100 pounds of heavy hogs. This does not mean that 11.4 bushels of corn were used in the production of 100 pounds of hogs, but that all the costs entering into hog production were such as to be covered, on the average, by a price equal to about that much corn.*

* Over a period of years price tends to equal necessary cost, not because the markets pay any direct attention to costs, but because the relation of price to cost governs supply. When the price drops below the equilibrium point, when farmers figure that the returns just cover the costs, they reduce their breeding operations. Later on, the reduced supplies, coming on the market, force the price higher. When the price rises above the equilibrium point, farmers are encouraged by the extra profits to increase their output; later the increased supplies reach the market and force the price down. The hog price which just equals necessary cost is apparently equal to that of 11.42 bushels of corn, for that represents the point at which farmers would apparently neither increase nor decrease their production. Hog production has been increasing during this period, however, so that the average ratio of 1 to 11.4 was not merely sufficient to maintain constant production, but was sufficient to maintain the average increase in production for this period. Since this relation has been sufficient to maintain an upward trend in production, somewhat less than 11.4 bushels of corn would represent the necessary cost for merely maintaining a constant production.

With the historical use of the ratio as such, we are not here concerned. But the ratio has been employed on the farm as a rule of action and to forecast the prospective profits from hog production. In view of the practical use of the ratio being made in current operations, it is important to realize how readily it may become misleading.

Four assumptions are apparently held to be implicit in the corn-hog ratio: (1) that in the long run the cost of raising corn and the value of corn approximate; (2) that the returns of corn raising are largely operative and are not dependent on land values, or that land values express predominately the relation of price of corn to cost of raising corn; (3) that farmers are free to market their corn as a cash crop or as a product crop, converted into animals; and (4) that there is a standard rate, or equivalent, of conversion of nutrients into animals.

In the first place, the setting up of the ratio requires clarification and standardization. Should the ratio be determined by farm prices or by wholesale terminal prices of graded corn? If wholesale terminal prices are used, a stated legal grade of corn and a stated class, weight, and grade of hogs must be selected and employed continuously from year to year if the results are to be comparable. Before the war, wholesale prices at Chicago were those usually employed. As the determination of weighted farm prices becomes perfected, it would seem to be sounder procedure to use them, in accord with the general tendency of judging agricultural prices, in relation to costs, by farm prices rather than by wholesale terminal prices. The corn-hog ratio of the United States Department of Agriculture is now based on monthly weighted farm prices of corn and hogs, which presumably reflect the farm values of total marketings.

Formerly, the ratio supposedly applied to No. 2 yellow corn and heavy-weight packer hogs. But there was often a premium on No. 2 corn and a discount on heavy hogs. The federal grain grading act was only passed in 1917 and prior to that time corn was commercially graded. It is commonly stated that No. 2 corn was believed to correspond to the average farm grade of corn; but within recent years the United States Department of Agriculture *Yearbook* no longer contains prices for No. 2 corn, giving only No. 3 yellow (monthly and weighted annual averages) and all grades and classes combined (monthly and weighted annual averages). The average wholesale price of corn is likely to be relatively higher than the average farm price because the best is shipped. In most years No. 2 has been distinctly above the average of the corn crop, and this may have introduced a bias into the ratio.

The term heavy-weight packer hogs has not had the same meaning from decade to decade. The relation of packer hogs to butcher hogs varies from year to year,

but the packer hogs now consistently rate lower than butcher hogs. The proportions of heavy to medium and to light hogs have not been comparable from time to time, and the price relation of heavy hogs to all hogs has not been constant. By the use of this one grade, which has become less representative of hog values, a bias may have been introduced. Clearly, if wholesale prices are henceforth to be employed, one should use the weighted average price of hogs. This might be done with Chicago prices or with the prices of the prominent markets. The prices and sales at these markets are now so representative and completely reported as to suggest that weighted prices would be more trustworthy in the make-up of such a ratio than the prices of one grade of corn and one grade of hogs.

In résumé: The corn-hog ratio may be based on farm prices or on terminal prices. In theory, farm prices ought to be preferable, but they are not so readily obtainable in comparable form as are terminal prices. Weighted prices of all grades are perhaps to be preferred to prices of stated grades.¹ The fluctuations in the corn-hog ratio from year to year are reasonably attributable in part to variations in comparability of data.

THE VALUE RATIO

Now it is one thing to use the corn-hog ratio as an interpretation of prices over a series of years; it is another thing to use it as a rule of action. The average farmer uses the corn-hog ratio not to judge the cost of corn but to indicate the prospective profits of feeding corn to hogs. The farmer tends to regard the price of cash corn as the lowest price he ought to receive for corn as grain or in hogs; he multiplies the cash price of corn by, say, 11.5

¹ The corn-hog ratio is now defined by the U.S. Department of Agriculture as the "number of bushels of corn required to buy 100 pounds of live hogs based on averages of farm prices of corn and of hogs for the month."

to get the price he expects to receive for his hundred-weight of hogs. He compares this with the current relation. It is thus implied that the going price of cash corn, sold for certain uses, ought to be the basis for the entire crop, sold for all uses. The cash price of corn is, in this sense, the yardstick. The cash price of corn applies to not over a fifth of the crop, coming largely from regions where it is grown as a cash crop. Even though the corn sold for cash were a constant fraction of the entire crop, it is not to be expected that the price growers received for one-fifth of the crop for a few uses on a limited market would represent the price to be received for the entire crop for many uses on divers markets. What the consumers of 500 million bushels of corn are willing to pay for particular uses need not represent what other consumers are willing to pay for other uses. The cash price of corn is what it is largely because so limited an amount is marketed. To judge the product price of corn by the cash price thus may be misleading. In the current use of the corn-hog ratio, it would seem to be assumed that the price of the first instalment, instead of the last, fixes the price of the entire supply.

The majority of farmers have very limited choice between feeding corn, selling it for cash, or carrying it over. A few farmers may be in position to vary the disposition, but with prospect of success only if others do not. Something like 1,300 million bushels of corn are fed to hogs; around 500 million are marketed for cash. If 100 million more bushels of corn were turned into the cash corn market, it would collapse. Taking the corn belt as a unit, the farmers cannot choose between feeding and selling; they must feed. The ratio may suggest to the farmer the price for which he is indirectly selling the corn he is feeding, in contrast with the price he is receiving for the small amount he is selling for cash. The quoted price ratio exists only because so little corn is sold.

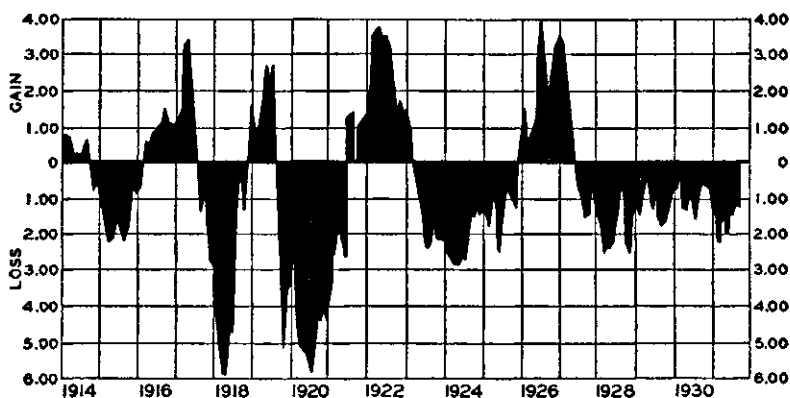
If one will contrast the volume of cash sales of corn with the cash price of corn, one will not find much evidence that farmers as a whole have exercised wide freedom of choice between feeding corn and selling it. If corn is high and hogs are low, feed-lot operators who buy both will restrict or suspend their operations; when corn is low and hogs are high, they will expand their operations with feeder pigs, and also with feeder cattle and lambs, if the same relations hold. The farmer who raises his own stock will feed to heavier weights when corn is cheap and tend to increase his breeding; when corn is high he will feed to lower weights and tend to restrict his breeding. But the man who has livestock is not free to sell his corn for cash and to sell his stock "as is," or nurse it along until the next marketing season. In the regions especially devoted to raising corn for cash sale, the corn goes to market for the most part whether the price is high or low, since, if the price is low, many of the farms are not equipped to bring in feeders and finish them. In some parts of the corn belt there is considerable scope for adaptation, but for the most part the farmer is not free, season after season, to choose between cash corn growing, raising and finishing animals on the farm, and feed-lot operations with purchased stock on the basis of the cash price of corn.

Wallaces' Farmer runs currently a chart which is here reproduced (Chart 6), covering the years since 1914. The title given this hog-corn chart obviously contains special pleading, since it is implied for the group that the farmer has a freedom of choice of determinative extent between selling his corn on the market and feeding it to hogs for the market.¹

¹ This assumes that the farm accounting from decade to decade has been on the strictly operative basis, that farming in the corn belt has been conducted solely with the objective of operating returns, without regard to unearned increment. But this has not been the fact. Ever since 1880, the corn belt has

CHART 6.—GAIN OR LOSS ABOVE OR BELOW AVERAGE IF AVERAGE FARMER FEEDS HIS CORN TO HOGS INSTEAD OF SELLING IT ON THE MARKET, 1914-31*

(Dollars per 100 pounds)



* Based on chart published monthly in *Wallaces' Farmer*.

The effect of the corn-hog ratio is largely applicable to hogs: only to lesser extent does the farmer sell more or less corn in response to price of corn relative to hogs. The hog raiser uses the corn-hog ratio to govern current feeding operations and current (and even future) breeding for future feeding operations. Thus we have short-time and long-time effects, on feeding and on hog

been farming in part in expectation of increment of land values, which was commonly called "deferred compensation." The failure of land values to maintain their expected advance between 1890 and 1900 was the cause of profound unrest. Between 1900 and 1910 corn-belt values for land practically doubled, and almost as much increase occurred from 1910 to 1920. The distress of the corn belt since 1920 is attributed as much to declining land values as to failure of operative returns. It is axiomatic in Iowa that prosperity in the corn belt presupposes an active market for land. With annually rising price of land, farmers have been willing to produce hogs without gain or at a loss; with stationary land values, farmers are not satisfied to produce hogs at a profit according to the corn-hog ratio. Farming in the corn belt has been a combination of operation and investment, and to regard the farmer as raising hogs on a strictly accounting basis is to hold a biased interpretation.

supplies. When the hog price is high relative to the corn price, husbandmen tend to feed hogs to heavier weights and some will fatten and market old breeding stock. When the corn-hog ratio is unfavorable to hogs, there is a tendency to restrict feeding and to market hogs at light weights. Also, the farmer, in discouragement, may sell off breeding stock. Typical bacon pigs are less affected either way; but when conditions favor heavier feeding, the number of packer hogs is likely to be increased, and heavy-weight butcher hogs predominate over light and medium weights. A high or low ratio tends to show its effects on slaughterhouse weights within a few months.¹

Obviously the corn-hog ratio has a different meaning for the farmer who has corn but no hogs, the farmer who has hogs but no corn, and the farmer who has both hogs and corn. In a particular year prices of both corn and hogs may be fairly in line with the prices of other grains and animals; but sometimes the price of corn alone is out of line up or down and sometimes the price of hogs alone is out of line up or down. Therefore, a particular corn-hog ratio may appear currently favorable to some farmers and unfavorable to others, depending on circumstances.

The effect of the corn-hog ratio on breeding is still more important than on feeding, since it is well known that the supply of hog products depends more on the number slaughtered than on the weight. Whenever the corn-hog ratio is favorable to hogs, a large majority of

¹ "Sometimes corn is so cheap and hogs are so high that the ratio may be 15 or 16 bushels for a year or so, but in such a case the result is the breeding of so many sows that there is an overproduction of hogs and a shortage of corn (unless the weather is unusually favorable), with the result that hogs become cheap and corn high and the ratio narrows suddenly to 10 bushels or even less. Usually, hogs sell for about two years below their long-time ratio with corn and then for about two years above it."—H. A. Wallace and E. N. Bressman, *Corn and Corn Growing*, pp. 280-81. In the fall of 1917 the minimum price of hogs was set, as basis, at \$15.50 per hundredweight for average packers' droves at Chicago, and the corn-hog ratio set at 13.3, which equalled 117 cents per bushel of corn. The war ratio sought to establish continuity.

husbandmen act on the assumption that this will continue, and expand their breeding operations in order to be in position later to take supposed advantage of high prospective profits. Farmers may increase breeding both for spring and fall farrowing, perhaps mostly for the fall. This misapplication of the corn-hog ratio is the principal cause of the cycle of hog prices. The misapplication by farmers of the corn-hog ratio results in a greatly expanded supply of merchandisable hogs a year later, and the high tide may continue for another year. When the corn-hog ratio is unfavorable to hogs, the reverse reaction obtains, and a year later there is a low supply of hogs. If the price of corn were kept artificially high, this would restrict breeding of hogs. Both for favorable and for unfavorable hog prices, it is assumed that the current situation will persist. As Haas and Ezekiel¹ have bluntly put it:

The basic reason for the continuation of the hog-production cycle has been failure of producers to look ahead. Because corn is high and hogs are cheap *right now* is no reason to conclude that the same situation will hold *next year*.

And, it might be added, because corn is cheap and hogs are high *right now* is no reason to conclude that the same situation will hold *next year*.

The farmers who turn out about the same number of hogs each year thereby balance the high prices of one year against the low prices of another year. A minority of farmers expand hog breeding when the majority contract it and, contrariwise, contract when the majority expand, and therefore have the largest number of hogs when prices are high and the smallest number when prices are low. But the majority is so overwhelming in the misinterpretation of the corn-hog ratio that the cycle of hog production and hog prices constitutes a recurring distortion in the corn belt.

¹ G. C. Haas and Mordecai Ezekiel, *Factors Affecting the Price of Hogs*, p. 23.

To some extent, acreage of corn may be directly influenced, but this is usually not pronounced. The adaptation to prices lies mostly in expansion or contraction of hog breeding rather than in expansion or contraction of corn acreage. But large acreage and high production of corn sooner or later lead to heavy breeding of hogs and oversupply of animals sent to slaughter. This must be true, because hogs are the chief outlet for corn; heavy production of corn, however provoked, finds outlet in increase in hogs. The crop of corn is thus of influence as well as the price as expressed in the corn-hog ratio, at least with some farmers. The same ratio might be found with a short crop of corn and a low count of hogs and with a large crop of corn and a high count of hogs. Some farmers would follow different practices under different circumstances. A heavy crop of corn tends to stimulate heavy breeding of hogs the following season and even in the second season; but it is usually the second successive large crop of corn rather than the first that brings about the pronounced glut of hogs.

It is important to note that in Germany, a net importer of hog products, where hog raising is an intensive branch of animal husbandry directly dependent on imported feedstuffs, the same cyclical occurrences are observed. In Germany it is not the corn-hog ratio, but the current ratio of hog prices to feed prices, especially prices of barley and potatoes, that misleads the landlords. Friedrich Aereboe, the most outstanding figure among the German agricultural experts, has for years endeavored to teach German landlords to raise hogs, not for the current price, but for the price reasonably to be expected when the hogs are to be marketed.

THE CONVERSION RATIO

What the farmer actually receives for corn fed to hogs is related not only to the price of corn according to

the corn-hog ratio (assuming that he could sell his corn), but also to the efficiency of his feeding operations. The customary corn-hog ratio is a value ratio; the number of bushels of corn nutritionally necessary to make (equivalent to) the hundredweight of live hogs may be termed the conversion ratio. If a farmer knows by experience in his feed-lot that he requires 8 bushels of No. 2 corn to make 100 pounds of live hogs in his drove, and if he sells the finished hog for \$10 per hundredweight, other things equal, the selling price of the corn fed is \$1.25 per bushel. This is the equivalent relation. In the long run, the conversion ratio is more important than the value ratio, though much less generally recognized.

Consider the simplest case—that of a man who has a feeding yard and buys both feeder pigs and corn. If one compares him with a manufacturer, his corn is like coal, the feeder pigs are the raw materials, the fattened hogs are the finished manufactures; he has capital invested in the feeding yard and in the purchases of corn and feeders, he has a managerial overhead. He looks for his profit to the added value of manufacture, conditioned by the good or poor judgment with which he has purchased his corn and feeders and by his skill in management. In the business is an element of speculation, in judging the trend of the market for hogs. At the end of the operation, such a man knows for how much more he has sold his corn and feeder hogs combined into market hogs than he paid for them separately. The farmer who raises pigs and corn is engaged in the same business, only his operations spread over a longer term and are more complex, both in the accounting and in the managerial senses.

The ratio that really has the most meaning for the net profit of the farmer is thus not the ratio of current prices of cash corn and cash hogs, but the conversion ratio on that farm, the amount of corn required to make (equivalent to) the hundredweight of hogs. It is the misfortune

of the corn belt that most farmers know much about the current price ratio of corn to hogs and little about their individual conversion ratio of corn into hogs. This exaggerates the element of speculation and detracts from the element of management.

What is the number of bushels of corn nutritionally necessary to produce a hundredweight of live hogs? It used to be a common feed-lot statement that it took 10 bushels of corn to make a hundredweight of live hogs. Extreme figures run from 4.5 to 16.5 bushels, the average being 8.25.¹ Such averages mean little; but it is clear that the number of bushels of corn necessary to produce a hundredweight of live hogs in feeding practice is usually less, and often much less, than the number of bushels of corn whose market value equals the market value of the hundredweight of hogs.

The conversion ratio of corn into hogs attained with the farm drove differs from the experimental findings secured with selected animals. It is easy to take half-grown barrows or gilts of good strains, weighing 100 pounds, feed them to 200 pounds at a rapid rate of gain in pounds per day, and determine the conversion ratio of the corn (and other nutrients on an equivalent basis) into hog flesh.² But the conversion ratio of the farm herd must take into account all the feedstuffs and also the maintenance requirements of the breeding stock. The computation of the value of pasturage and other nutrients is difficult enough; but the chief fluctuation lies in variations in outturn of merchandisable hogs per head of breeding stock. Whether the average litter brought to maturity numbers three or six or nine makes the outstanding difference in the conversion ratio of the farm drove. Whether a sow farrows once or twice a year is cor-

¹ *Agriculture Yearbook, 1922*, pp. 225-26.

² Cf. W. A. Henry and F. B. Morrison, *Feeds and Feeding* (Madison, Wisconsin, 1917), pp. 56 ff.

respondingly important. The three major factors in the cost of producing hogs are cost of corn, the size and number of the litters (per sow) brought to maturity, and feeding efficiency. The size of the litter is often the most important factor. In the 1922 *Yearbook* of the United States Department of Agriculture (pp. 223-24) are figures illustrating differences in cost related to size of litters. Drovers averaging three pigs to the sow showed a cost of \$6.24 per weaned pig, while droves with an average of eight pigs to the litter showed a cost of only \$4.45 per pig. The number of pigs farrowed and the number that can be suckled are largely the expression of selection of breeding stock. Since (apart from occasional years) more pigs die from accidents and neglect than from disease, the variations are largely the result of differences in management. The comprehensive way of measuring the out-turn would be to determine the average gross weight of merchandised pigs per head of breeding stock per year.

As between cost of corn and efficiency in feeding, the former is commonly believed to be the more important, but over the years this is doubtful. With farmers, possessing good breeding stock, who bring large litters to early maturity with scientific feeding, the price of corn is probably the least important of the three major factors. Hogs up to 200 pounds ought now to be produced on less than 7 bushels of corn per hundredweight; some are produced on 6 bushels per hundredweight. Therefore, directly to judge the cost of hogs by the corn-hog ratio is quite as likely to be misleading as informative.

The management involved in making money by converting corn into hogs is to raise corn cheaply, raise large litters of pigs, bring them to maturity early, and finish them on the least number of bushels of corn per 100 pounds. It is management rather than price ratio that determines the business: not how many bushels of corn *at present cash price* correspond to 100 pounds of hogs

at present market price, produced "any old way," but how much is received per bushel of corn actually fed to hogs efficiently produced.

DEFINITION AND MEASUREMENT OF SURPLUS OF HOGS

The hog surplus is hardly susceptible of definition and still less open to measurement. In part, the surplus has been the automatic result of a continuing policy of land settlement. In this sense, the hog surplus is one of the expressions of investment in land. In part, surplus of hogs has been due to diversification of agriculture, since the profits of cattle raising and dairying involve the utilization of their by-products by hogs. Also, the hog surplus is due to the agricultural tendency of the hog-deficiency regions to develop a diversified agriculture. To some extent the hog surplus is the result of easy raising of corn and decline in the number of horses. Finally, the hog surplus has been due to stimulation of price, in particular the surplus at the peaks of production of the hog cycle, due to overbreeding in the hope of increasing the returns on corn. The several factors in surplus production have varied from decade to decade. Today, easy corn raising on established farms, the price influences in the corn belt, and the impulse for diversification in the deficiency regions are probably the most potent factors in maintaining the surplus of hogs. The surplus of corn is only partly an acreage surplus, but the surplus of hogs is largely a surplus of breeding.

The surplus of hogs cannot be measured by the percentage of hog products passing to export, since domestic consumption is not constant. Domestic demand tends to expand and contract inversely to prices of hog products, and directly in relation to prices of substitutive food-stuffs. Other things being equal, the hog surplus would become the larger the higher the price level, because with higher prices consumption is curtailed while production

is stimulated. Conversely, other things being equal, the hog surplus would become the smaller the lower the price level, because consumption would be stimulated at lower prices, while production would tend to be curtailed.

But "other things being equal"¹ includes many and varying factors. In a year of low prices, while breeding might be curtailed, marketing of hogs might be expanded, in liquidation of stock. Under such circumstances, low hog prices might provoke rapid and disproportionate marketing, so that, despite heavy consumption, the surplus on the market would be not reduced but rather maintained or even exaggerated. The lag between price influence and farrowing and between farrowing and marketing, the varying age distribution of breeding stock, and the varying relations between spring and fall breeding operate to confuse the situation, despite the shortness of time necessary to bring pigs to market maturity. Hog production means both breeding and marketing, just as consumption means both slaughtering and retailing; the relations between breeding and marketing and the position of stocks between slaughtering and retailing are intervening circumstances of importance.

The surplus cannot be defined as the difference between customary domestic demand and that level of production which hog raisers in their cumulative efforts regard as the best expression of their operations. Such a figure for surplus would be in excess of any surplus that has ever occurred; but one does not need to search far in the discussion on farm relief to learn that something approaching such a figure for surplus is what some of the spokesmen for the corn belt profess should have been provided. The surplus cannot be clearly defined unilaterally from either the producer's or the consumer's side.

¹ We ought to say "other things equal and weighted," but this would represent a refinement not warranted by the extent and reliability of our statistical data.

The surplus is the varying quantitative expression of interacting factors of prices on the one hand and technical agricultural considerations on the other. These bilateral influences weigh differently in different years and do not in any season weigh alike with all farmers.

The surplus of hogs might perhaps be defined practically as the varying excess over and above a relatively stabilized level of consumption. The varying surplus would thus correspond to the exports adjusted for changes in stocks. Defined in this way, a deficit in hog supply might occasionally appear. Between 1900 and 1914, when we were still a net beef exporter, variations in federally inspected slaughter (dressed weight) were in two years as high as 13 per cent in the case of beef and over 25 per cent in the case of pork. Since the war, the year-to-year variations in the slaughter of beef have several times been close to or above 10 per cent, and in the case of pork several times around 10 per cent, and once over 20 per cent. There is, therefore, some justification for regarding the surplus of hogs as due in part merely to year-to-year fluctuations in supply. One important distinction is to be observed between cattle and hogs since the war.

With cattle, the fluctuations in supply are now absorbed by adjustments within domestic consumption, and unusual slaughter in any year does not lead to an exportable surplus. With hogs, however, variations in slaughter have not been absorbed by adjustment in domestic consumption, but have found expression in fluctuations in export and stocks. This difference is not to be explained on the basis of consumption habits. Consumption of beef and pork are quite comparable in quantity. Taking the data¹ at their face value, for the past thirty-one years

¹ Bureau of Agricultural Economics, U.S. Department of Agriculture, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, p. 10.

(1900-30) the average per capita beef consumption was 63.8 pounds per annum, the highest consumption was 77.5 pounds, the lowest 50.1 pounds; the widest change from one year to another before the war was 7.5 pounds and since the war 6.7 pounds. With pork, the average per capita consumption during the same years was 63.2 pounds, the highest 74.7 pounds, the lowest 49.3 pounds. The widest change from year to year before the war was 7.4 pounds and since the war 8.6 pounds. The figures suggest somewhat greater elasticity of demand for pork than beef; yet it seems possible that domestic demand adjusts itself to fluctuations of supply with beef better than with pork. Certainly it seems clear that an increase in slaughter, which for hogs would lead to notable increase in export, for cattle does not provoke export of beef. An increase in supply of hogs will find relief in export largely in the cured state, in semi-perishable products. But beef would need to be exported fresh, frozen, or chilled, on account of limited market for cured beef products. The packers tend to export for the most part the same run of goods they prepare for domestic consumption. But to prepare frozen or chilled beef for the export market would represent a deviation in business, since a domestic refrigerated beef trade is not conducted on a basis comparable with foreign trade. Apparently, the domestic market has absorbed increased amounts of beef with relatively less decline of price than in the case of pork. Export of beef being more risky than export of pork, and domestic prices of beef being presumably less depressed by large supplies than in the case of pork, the net result of the two factors working in the same direction is that variations in supply of beef are met without export by adjustments in the domestic market, but variations in supply of hog products find expression in varying exports. Yet this general explanation runs counter to the popular view that the public has been turning from beef to pork.

A secular definition of the hog surplus would be represented by the surplus exported decade after decade. There is indeed no other adaptable definition. The practical problem of the surplus relates to the exportable surplus. The term "exportable surplus" in itself contains an implication. Linguistically considered, exportable means "to be exported" or "can be exported"; but in fact the exportable surplus is often the fraction that *must* be exported, left over after domestic demand at the price level is satisfied. The exports, plus or minus the changes in stocks, therefore correspond to the operative surplus, practically viewed.

We may apply also to hogs the comment made on corn, that as long as the purchasing power of hogs was rising it was natural for farmers to feel that no surplus existed. Thus construed, no surplus of hog products existed during the forty years before the World War but a surplus has existed since, regarding the period as a whole.

Hog products are exported in so many forms that it is unfeasible to reduce the exports to units of live hogs except in an approximate way. Slaughtering losses vary with the different types, weights, and grades of live animals. Rendering losses change with variations in material. The weights of cured products do not correspond closely to green weights. The hog equivalents of barreled pork and dry salt pork are different and variations occur in each class. The water content of hog products exported is lower and the salt content higher than in the dressed weights. About all that can be done is to compare the gross weight of all reported exports with the gross live weight of hogs slaughtered or with the gross dressed weight of hogs slaughtered. In the present unsatisfactory state of statistics of rural slaughter, the least unsatisfactory procedure is to combine the reported figures for slaughter under federal inspection in terms of dressed weight and lard, and compare these with the gross figures

for combined exports in all forms. These data for the years 1900-30 are given in Appendix Table III.

It is, however, also necessary to consider the fractions of the several hog products in the gross exports. At the outset we encounter the fact of the outstanding preponderance of lard in the exports. The exports of lard compared with all other hog products are shown in Table 6.

TABLE 6.—UNITED STATES EXPORTS OF LARD, COMPARED WITH THOSE OF OTHER PORK PRODUCTS, 1900-13 AND 1921-30*

Year	Total exports of pork and lard (million pounds)	Exports of pork and pork products (million pounds)	Exports of lard (million pounds)	Relation of lard exports to total exports of pork and lard (percentage)
1900.....	1,462	847	615	42.1
1901.....	1,471	859	612	41.6
1902.....	1,148	641	507	44.2
1903.....	1,110	569	541	48.7
1904.....	1,156	585	571	49.4
1905.....	1,392	684	708	50.9
1906.....	1,418	733	685	48.3
1907.....	1,209	615	594	49.1
1908.....	1,219	632	587	48.2
1909.....	947	485	462	48.8
1910.....	706	324	382	54.1
1911.....	1,080	470	610	56.5
1912.....	1,014	456	558	55.0
1913.....	1,049	468	581	55.4
1921.....	1,662	759	903	54.3
1922.....	1,526	727	799	52.4
1923.....	2,035	960	1,075	52.8
1924.....	1,721	735	986	57.3
1925.....	1,268	549	719	56.7
1926.....	1,159	426	733	63.2
1927.....	1,033	316	717	69.4
1928.....	1,135	334	801	70.6
1929.....	1,245	379	866	69.6
1930.....	988	314	674	68.2

* Data from Bureau of Agricultural Economics, U.S. Department of Agriculture, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, pp. 8-9.

In the first years of the century, the combined exports of hog products other than lard exceeded the exports of lard. But in the four years preceding the outbreak of the war, exports of lard predominated. (Exports during the war mean nothing for the present argument.) Since 1920, the annual exports of lard have exceeded the combined exports of other hog products. During the last four calendar years, the reported weight of lard exported has been nearly 70 per cent of the reported weights of the total combined exports of pork and lard. When we combine with the lard the fat contained in the pork exported, especially in the salted and pickled pork, we realize the preponderance of fat over protein in our export of hog products. If we take the fat content of shoulders at 30 per cent, hams at 40 per cent, bacon at 60 per cent, and salted and pickled pork at 70 per cent (including the Cumberland sides with the bacon and the Wiltshire sides with the hams), and assume that of the gross weight of hams and shoulders hams comprise five-sixths and shoulders one-sixth, it follows that during the four years July 1927—June 1931 the exports of hog products contained over 85 per cent of fat. This approximate figure lends emphasis to the statement that our exports of hog products are predominantly an export of fat and not of protein. The preponderance of lard illustrates the entire situation.

This suggests that the term "surplus hog production" really ought to read "surplus hog-fat production." It is not directly the number of hogs slaughtered in excess of the number desired for domestic consumption; it is rather the fat content of the hogs slaughtered that really defines the surplus. If the average live weight of hogs slaughtered were 200 pounds, other things being equal, the existing preponderance of lard in our exports would practically disappear. The surplus hog problem is therefore not merely a numerical problem; it is equally a problem of composition. A clear-cut measurement of the hog surplus

is not available, and indeed cannot exist; but however defined, lard is the chief component.

In the case of hogs, there is no such thing as acreage surplus or climatic surplus (apart from pestilence), unless one considers the number of hogs as the automatic and necessary reflection of the acreage or crop of corn. In this sense, an acreage surplus of hogs might follow an acreage surplus of corn, or a climatic surplus of hogs follow a climatic surplus of corn. Since in a previous section we reached the conclusion that the surplus of corn is determined by acreage (overplanting) as well as by yield, it follows on the basis of interrelation of corn and hogs that the most significant surplus of hogs is an acreage surplus. This interpretation of the situation is reinforced by the fact that the program of breeding lies largely within the farmers' control.

As with corn, the most useful concept of the surplus of hogs relates to the equation of supply and demand in price. It may be applied as well to the marketing of live hogs for slaughter as to the marketing of fresh and cured products. Whenever the supply is relatively so large that it can be disposed of only at a substantial reduction in price, then farmers, commission merchants, packers, and economists will agree that for the time being there is a surplus of hogs and hog products. Out of the relationship between the disposable supply and the effective demand, as equated in price, emerges the item of surplus. Neither for corn nor hogs is there any purpose, at the time, in discussing what demand or consumption ought to be; one does not evade the factor of surplus by invoking underconsumption. The extent of surplus will be inferred from the degree of price reduction. According to the sum total of circumstances in the market, the surplus on occasion may be smaller with a large supply than with a small supply. To hogs even more than to corn can we apply the term "operative surplus."

**CONTRAST BETWEEN ANIMAL AND VEGETABLE FATS
AND OILS**

Apart from vitamins contained in some fats and oils and disregarding the unsaturated fatty acids contained in other fats and oils (the drying oils used in paints), the various animal and vegetable fats and oils tend to have the same chemical properties. If they have different physical properties, these are to a large extent susceptible of technical modification. All the fats and oils lend themselves to refining, clarification, decoloration, neutralization, and deodorization. Through various technical procedures, including especially hydrogenation, the fats and oils (least of all perhaps coconut fat) have become substitutable over a wide range.

Available on international producers' markets are butter, beef and mutton tallow, oleo oil and animal stearin, lard and neutral lard, foots and inedible greases secured as residues and by-products of domesticated animals. Available also are fish oils and various marine oils. Available, finally, are a large number of vegetable oils and foots, including cottonseed, peanut, corn, soy bean, sesame, olive, palm, palm kernel, and coconut. We possess no complete or trustworthy statistics on the production and distribution of fats and oils, largely because they appear in commerce in part unexpressed, in part expressed but unrefined, and in part refined. There is, however, no question that the volume of fats and oils in international commerce has expanded during the past thirty years more than the rate of growth of population and the rate of expansion of production of cereals.

Highly significant are two divisions relatively new in the large sense: the tropical vegetable oils and the marine fats. The tropical vegetable oils (especially palm, palm kernel, and coconut) owe their present commercial vogue largely to colonial exploitations of Great Britain, Holland, Belgium, France, and the United States. The marine fats

are the newest factor in the situation. The marine oils can hardly be called high grade; but since they may be hydrogenated to any desired melting point and freed of flavor and odor suggesting their origin, they are adapted to the manufacture of substitutes for butter and lard and to innumerable industrial uses.

Broadly considered, fats and oils find but limited use as feedstuffs since for several reasons it is preferable to have domesticated animals build their body fats from carbohydrates. Fats and oils serve in the nutrition of the human body largely as carriers of energy—supporters of muscular work and body heat. These functions the fats and oils share with carbohydrates. Within reasonable limits it is immaterial to the animal body whether body heat and muscular work are maintained by carbohydrates or by fats and oils. From this circumstance it follows, broadly considered, that fats and oils in the food supply must be priced to correspond with the prices of carbohydrates. Just as the different fuels must be comparably priced in manufacturing industries, so the two classes of energy foods (oils and fats and carbohydrates) must be comparably priced in the human diet.

Confining ourselves to countries with white populations, we find that a large number of animal and vegetable fats and oils enter into the customary food supply. These are used as such, traditionally; but more and more, as time passes, they are being mixed to form blended products for the table and kitchen, of which oleomargarine and margarine, lard substitutes, and various cooking compounds are the outstanding illustrations.

These fats and oils form an overlapping series, in uses and in prices. At the top stand unsalted sweet-cream butter and superfine olive oil, of which one or the other may carry the highest price, according to circumstances. Standard butter and standard salad oils occupy a lower and comparable level. The refined palm, palm kernel,

coconut, and soy bean oil tend to be the cheapest of their group. Lard occupies a variable position relatively low in the scale. These relations vary from country to country and from year to year, and are considerably influenced by custom, religion, and circumstances of agriculture. The important fact is that the animal and vegetable fats and oils constitute an overlapping series susceptible of technical integration, with overlapping prices; they are more or less competitive, on the basis of substitution, over the entire scale, with coconut in a somewhat detached position.

The integration of the animal and vegetable fats and oils lends itself to large-scale undertaking. Of this, perhaps the best illustration is the margarine trust of Europe. A soap trust in Europe is in the making; perhaps a lard substitute trust may conceivably follow. Of all the important animal fats and oils, lard possesses perhaps the least distinguishing characteristics and is therefore exposed to competitive substitution. In the United States, the lard substitutes have led all substitutes for other natural fats and oils, with the butter substitutes much less prominent. In Europe, on the other hand, butter substitutes have led, with lard substitutes much less prominent. We regard this as the first stage of the movement in Europe; we do not expect cooking compounds to replace fluid vegetable oils south of the latitude of the Alps, but we do anticipate the extensive replacement of lard with lard substitutes north of the latitude of the Alps. Whether vegetable oils are fabricated into margarine or into lard substitutes depends on a number of factors which vary from country to country, including costs, taxes, laws governing use of color, and regulations on branding. It costs more to manufacture margarine than lard substitute out of vegetable oils; but the margarine contains 15-20 per cent of water, while the lard substitute is practically water free. Unless offset by taxes or other impositions, the price for which the water in margarine is sold more than makes up the differ-

ence in costs. Thus is explained, in large part, the current predominance of margarine over lard substitute in Europe and of lard substitute over margarine in the United States. But these need not be permanent relations.

The trend has been clearly in the direction of disproportionate expansion in the use of vegetable oils. The United Kingdom serves as a good illustration. The fat supply of the United Kingdom during 1909-13 and 1924-28 averaged as follows,¹ in metric tons:

	Average 1909-13	Average 1924-28
Butter	321,000	325,000
Lard	90,000	120,000
Margarine (largely vegetable) ..	118,600	248,000
	<hr/>	<hr/>
Total	529,600	693,000

The nutritional investigations of the past two decades have served to give to milk fat a preferential position and to demote hog fat, beef fat, and mutton fat to the status of mere fats. These fats, with their attributes reduced to the chemical properties of the three common fatty acids and

¹ Data from T. B. Wood, *The National Food Supply in Peace and War*, p. 4; and A. W. Flux, "Our Food Supply before and after the War," *Journal of the Royal Statistical Society*, 1930, Vol. XCIII, Part IV, pp. 538-60.

The use of fat compound is on the increase in Germany, where it is called *Kunstspeisefett*. The most popular preparations contain only vegetable materials. Good compounds sell about midway between cheap and dear margarines and are used in households as well as in bakeshops and public eating-places. The following table, prepared from data of the *Reichsforschungsstelle für Landwirtschaftliches Marktwesen*, illustrates the increase of use of vegetable oils in recent years.

TOTAL FAT CONSUMPTION IN GERMANY
(Thousand metric tons)

	1927	1928	1929	1930
Margarine	418	440	470	501
Butter	394	452	484	442
Lard	208	205	203	201
Vegetable oils and fats.....	183	232	243	242
Tallow	12	10	10	8
	<hr/>	<hr/>	<hr/>	<hr/>
Total consumption	1,215	1,339	1,410	1,394

to their caloric content, now meet the marine and vegetable fats and oils on a plane of comparative parity in utility. With advancement in technological processes, marine and vegetable fats and oils encroach more and more upon the carcass fats of the domesticated animals. In particular, lard has acquired a host of commercial enemies. Under these circumstances, the commercial uses of the competitive fats and oils rest more and more on the basis of costs. The corn-belt farmer cannot be regarded as a low-cost producer of fat, nor is the fat he produces of exceptional qualities.

TENDENCIES MAKING FOR SURPLUS

Is the surplus of hogs transitory? Does it represent a phase in the agricultural development of the country? Prophecy is hazardous, but the circumstances involved in the future of animal husbandry in this country would seem to be so clear as to make prophecy here less hazardous than usual.

One must look backward over the history of development of animal husbandry in this country and forward into the potential of agriculture based upon the relations of population to area, the characteristics of soil and climate, and technical advances. In the sense that it may be said that our export of cattle and their products was transitory, representing a phase in the development of the country, this is not to be said for hogs. Quite the contrary—the factors which made the export of cattle products transitory tend to make the exportation of hog products persist.

The export of cattle was the expression of the open range. Export of beef became negligible in 1911, significant imports began in 1913, and the country was a net beef importer in 1914. Immediately after the cessation of the heavy war exports of the years 1915–20 (based directly and indirectly on government credits), the export

of beef declined to the 1912-13 level, and in 1926-30 we were again on the net import basis, though the trade has remained insignificant. Our imports of hides of cattle and calves far exceed our exports.

The future beef supply of the country may be expected to depend more and more on feeders imported from Canada and Mexico. At present, quarantine regulations, as well as import duties, restrict the entry of cattle. Gradually it is becoming apparent that the tariff on live cattle does not further the commercial interest of the corn belt, though it does meet the interest of the Western states where ranchers are still engaged in raising range cattle. Eventually, the corn belt, desirous of enlarging the supply of feeder cattle, and the industrial states, favoring a cheaper meat supply, may unite to secure free trade in live cattle from Canada and Mexico, under appropriate sanitary regulations.

If, as, and when this time arrives, the beef and veal supply of the country will be composed of three fractions: (1) carcasses of domestic cattle of beef type, or all-purpose type, consisting largely of baby beef and old cows; (2) carcasses of imported feeders, finished in the United States; and (3) carcasses of dairy stock.¹ This forecasted position of the cattle industry is based on the grass requirements of herbivorous animals, and the low rate of conversion of nutrients into meat characteristic of animals that do not reach anatomical maturity in less than two years. Revival of exportation of beef and material increase in importation of beef are alike improbable.

The position of swine is entirely different. The hog is an animal whose domesticated habits and physiological characteristics adapt it particularly to diversified agriculture. With a short period of gestation, the pig reaches an

¹ Incidentally remarked, the domestic beef supply of Great Britain is now in essentially the same situation—beef being secured from domestically raised beef cattle, imported store cattle, and exhausted dairy cows.

advantageous merchandisable weight at six months of age; the sow can produce two litters annually for several years, and thus the turnover is rapid. The hog is omnivorous, a scavenger disposing of all manner of digestible refuse, but characterized by high efficiency in the conversion of nutrients into flesh. The pigsty of the townsman, like the home garden and the poultry-yard of the villager, is passing away, even in small country towns; but the pig is finding a place as scavenger on fruit ranches and truck farms. Hogs are concomitants of the dairy and offer the most advantageous disposition of buttermilk and skim milk. Properly prepared, the small grains are well utilized by hogs; they do well on the legumes and grasses employed in crop rotation. In the double rôle of scavenger and efficient converter of nutrients, the hog belongs almost universally on the American farm. The self-feeder for hogs, the movable pen, the mineral and supplementary rations, and the "ton-litter" yardstick, all make for increase in surplus of hogs.

Envisaging the development of agriculture, it seems clear that the effective technical utilization of the land may entail increase in hogs. This means that a surplus of hogs may be expected to continue as the expression of diversified agriculture. It seems certain that the surplus of hogs will continue after the exportable surplus of grain has declined to negligible volume or disappeared. So long as there is a direct (as grain) or indirect (as animal products) exportable surplus, it is to be expected that indirect export will continue longer than direct export. Because swine are essential in diversified agriculture, the exportable surplus must be expected to continue, just as the exportable surplus of cattle has discontinued because of the disappearance of the range. The surplus of hogs is therefore in a sense a routine, at the least a contingency, not an emergency situation.

That a surplus of hogs is the natural expression of

our agricultural resources would seem to be indicated. If one accepts 160 million as the limit of population fifty years hence and 75 pounds of pork and lard per year as the annual per capita ration, 85 million hogs of 200 pounds weight slaughtered per annum would more than suffice to cover the domestic demands. In view of the area adapted to grain and improvement in production of animals and control of infectious diseases, it thus seems not unlikely that a surplus of hogs will long persist.

This interpretation of the future trend is not inconsistent with Chart 2 on page 46, illustrating the decline in per capita hog production over the past fifty years. It means that with the expected rate of growth of our population, the per capita hog production will not further decline to the level of domestic requirements. To suggest what might be the per capita pork and lard consumption and the per capita hog production twenty years hence would involve more surmise than computation.

FACTORS WORKING AGAINST SURPLUS

Clear-cut factors operating in this direction are not conspicuous. The per capita number of hogs is declining, but this is a relative trend. Possibly a declining farm population may tend to be accompanied by a declining count of swine. If, in consequence of depredations of the corn borer or from other causes, the price of corn should become and remain consistently high, this might tend to reduce the number of hogs in the country. A trend of increase in cost of production of hogs would be accompanied by some reduction in numbers. Practically speaking, however, the number of hogs is to so large an extent the expression of choice of operations by farmers that factors making for reduction in the number of hogs must be such as apply as incentives acting on animal husbandry.

Intensification of the diseases to which hogs are espe-

cially subject (more cases or greater virulence) now tends to make farmers reduce breeding operations, especially in areas like the corn belt with high concentration of farm population. The lower the incidence and death-rates from infectious diseases, the freer the hog breeder feels from such restraint. Presumably, therefore, no pronounced effect on curtailment of surplus is to be expected from this factor, since the control of infectious diseases is being steadily improved.

SUMMARY

A gradual but irregular decline in number of swine since 1919 (with the highest figure in history in 1923) represents the recession from the high plane of activity established during the war. Lacking more frequent estimates, one assumes that the figure of hogs reported for the first of January is representative of the position during the year; but this cannot be true, though the significance of the possible deviation is not known. The corn belt contains over two-thirds of the hogs of the country, and the proportion of hogs there devoted to commercial operations is still higher.

The production of hogs follows a cycle. This has nothing to do with breeding characteristics or diseases of the animals; it depends on the owners. The cycles are irregular, the curve usually shows narrow peaks and troughs, though in the 'nineties the number of hogs remained quite constant for nearly a decade. Some farmers limit their hog crop to their feed crop, others raise hogs to sell as feeders, while others buy feeders to use up their corn; thus the variations with the different farmers produce fluctuating results in the number of hogs.

Hogs are disposed of by slaughter on the farm or off the farm. Hogs slaughtered on the farm are outside of federal inspection and to a surprising extent are subject to no inspection by state, county, or township authorities.

Slaughter outside of the farm is in villages, towns, and cities. Slaughter is under federal inspection whenever the products are to pass into interstate commerce and a large proportion of hogs slaughtered in cities for intrastate consumption are also killed under federal inspection. All exported hog products are derived from animals slaughtered under federal inspection.

Ratios of hogs slaughtered to the number of hogs in the country are uncertain because the number reported on January 1 need not be representative of the year, and there is room for a large error in the estimate of total slaughter.

The supply of hog products is determined by the number of animals slaughtered, the weights of the slaughtered animals, and the subtraction of inedible material at the different weights and ages.

The census of 1930 included reports on wholesale slaughter, custom slaughter, retail slaughter, and farm slaughter; but the reports in previous censuses were so incomplete and unsatisfactory as to furnish no trustworthy base-line. Of annual estimates we possess reliable reports of number and weights of hogs slaughtered under federal inspection; we possess no trustworthy annual reports of hogs slaughtered outside of federal inspection. In particular, we lack trustworthy annual reports of hogs slaughtered on farms. In the available annual statements of hogs slaughtered and meat and lard produced, the estimates of slaughter on farms are secured by the use of ratios, which are badly in need of revision. When it is recalled that around a fourth of the hogs are reported as slaughtered on farms, the possible plus-and-minus error thus introduced into the figure for total supply of hog products becomes obvious. The method of separating lard from pork is arbitrary and also uncertain. We thus possess no certain annual figures for the divers hog products. This insecurity in the estimate of the total supply tends

to vitiate even approximate reasoning on domestic requirement and exportable surplus of hog products.

Hog raising was developed in the corn belt as a part of diversified farming, on the basis of the once correct postulate that raising hogs was the cheapest way of converting grain into fat and the corn belt the most efficient region in which to do this. Under these circumstances, the lard hog became the preponderating type in the corn belt; hogs were raised primarily for fat and secondarily for protein. With the beginning of the century, and more especially since the war, public taste in meats has inclined toward the cuts of leaner and smaller animals. Out of this has evolved the bacon-type hog, the use of the half-grown "porker" for fresh pork, and the market types of baby beef and lamb. This has led to changes in the breeding and feeding of animals. Practically everywhere outside of the United States the bacon hog has been supplanting the lard hog. The corn belt, however, has continued to raise lard-type hogs and to finish them to heavy weights, despite the fact that the public prefers bacon to mess pork and lean bacon to fat bacon. In particular, our competitors on the world markets have specialized in smaller and leaner animals of the bacon type and have secured a corresponding prestige. Furthermore, lard suffers from ever intensified competition with other fats and oils. The free availability of vegetable oils, and the fact that they may be marketed in the form of substitutes closely resembling lard, seriously impairs the market position of lard hogs, especially those of heavy weights. Alike from the standpoint of feeding efficiency, outturn of protein, and utilities of lard, the use of the lard hog represents a disadvantageous feature of the agriculture of the corn belt.

Hogs may be regarded in the market sense as condensed corn, a condensation in small part to high-priced protein, but in much larger part to low-priced fat. The

predominating relation of corn to hogs has found expression in the corn-hog ratio of the corn belt. This ratio represents the number of bushels of corn the market value (terminal or farm) of which equals the market value (terminal or farm) of 100 pounds of live hog. The farm ratio runs under unusual conditions from 7 : 1 to 18 : 1 but is usually between 10: 1 and 12: 1. The farmer uses the ratio to determine breeding and feeding: when the price of corn is low relative to that of hogs, breeding is expanded and feeding is promoted; when the price of corn is high relative to that of hogs, breeding is restrained and feeding is restricted. The misuse of the corn-hog ratio is the factor largely responsible for the cycles of production of hogs, resulting in shortage with high prices and gluts with low prices. The corn-hog ratio has nothing to do with the amount of corn required to produce a stated weight of hog; it is purely a price ratio and usually misleads the majority of farmers.

The amount of corn required to produce the unit of live hogs may be called the conversion ratio. This depends upon the strain of animals used, the ages to which they are fed, and the efficiency of feeding operations. The conversion ratio runs from 5 to 15 bushels of corn to the hundredweight of hogs. This is the real ratio upon which farmers should base their operations.

The hog surplus is difficult to define, still more difficult to measure. It does not mean much to define it as the difference between the level of customary production and customary domestic consumption. Perhaps the best definition is to relate the surplus of hogs to the exports of hog products. Yet this definition is misleading because of the several forms in which hog products are exported. The surplus hog production which has the greatest meaning to producers is the surplus of lard.

It is in relation to other fats that the surplus fat of hog production acquires its outstanding meaning. For all uses

lard is merely one fat out of many. It contains no vitamins and has no distinguishing nutritional qualities. It has no distinguishing physical or chemical qualities—it is merely one of a series of fats for nutritional or industrial use. In particular, for most uses lard stands on no more than a par with vegetable and marine fats and oils. The various oils and fats form an overlapping series in their price relations. Not including milk fat, there seems to be evidence in the world of growing preference for vegetable oils over animal fats.

The surplus of hogs is not a transitory phenomenon. We do not expect the surplus of hogs to disappear as have disappeared the surpluses of cattle and of sheep. The position of swine in diversified American agriculture, the extent of cereal growing, and especially the acreage adapted to corn, the several disadvantages attending the husbandry of cattle and sheep, and the declining rate of growth of the human population—these and other factors tend to confirm the continuation of the surplus of hogs. It is the extent, not the continuation, of surplus that is open to question.

CHAPTER IV

EXPORTS OF CORN AND HOGS

Introduction—Export of corn—Export of live hogs and fresh pork—Export of hog products—Summary

INTRODUCTION

One main step in our appraisal consists in an analysis of the prices of corn and hogs, with the view of defining to what extent domestic and foreign factors, respectively, are effective in determining farm prices for corn and hogs in the United States. Preliminary to this comes examination of the exports of corn and hogs. We shall need to examine the volumes of export, the countries to which they have gone, the seasonal rates of movement, and the price relations. The export of corn is a very simple topic, since the significant exports occur only in the state of shelled corn. The export of hogs occurs not as live animals or refrigerated carcasses to any significant extent, but as cured products, including hams, shoulders, bacon, pickled pork, and lard. Dealing with a series of joint products of widely varying prices, the topic is involved and our examination of it leaves much to be desired.

EXPORT OF CORN

The United States produces some two-thirds of the corn of the world, but has now a small percentage of the international trade in corn. Indeed, in view of our pre-eminence in production,¹ our exports have become almost

¹ While corn products are being extensively elaborated in this country, the export trade in corn products has little significance. Corn meal and flour scarcely move outside of border trade. There is some export of starch, hominy and grits, glucose, and corn oil. During none of the past five years did the largest amount of corn products exported aggregate 450 million pounds. While this amount was relatively large in years when the export of corn as grain was very small, the item is not large enough to influence the disposition or price of the American crop of corn, and is not here to be considered further.

insignificant. Argentina, producing only about a tenth as much as the United States, exports the bulk of her crop and is by far the leading exporter. The region of the lower Danube exports usually much larger quantities than the United States. The Union of South Africa has become an exporter of note, and in 1925-26 exported more than we usually do.¹ Before the war, Imperial Russia exported nearly as much as the United States; but Soviet Russia has not been active in the international corn trade.

Appendix Table V presents the net exports of the chief corn-exporting countries. As feedstuff, corn competes mostly with barley, oats, and oil seeds, though each has its preferred uses. Since animal husbandry is on the increase throughout the world, the international trade in corn may also be expected to expand. But neither the analysis of import need for corn by countries nor the trend of corn production in exporting countries indicates anything of application favorable to the United States.

Time was when the United States was a heavy exporter, with reference both to the size of the domestic crop and to the total volume of corn in international trade. Appendix Table VI contains the figures from 1880 to date for the corn crop, the domestic export, and the percentage of the crop exported. From 1880 to 1895 the exports, while considerable, were irregular and only once exceeded 100 million bushels; in no 5-year period did the average exceed 3.5 per cent of the crop. From 1895 to 1900 were years of continuously heavy exports, always over 100 million bushels, and twice over 200 million bush-

¹ While Argentine corn dominates the world market, one must not overlook the growing exports from the Union of South Africa. These have passed the 10-million-bushel mark, and the prospect is for continuous augmentation. For the time being, it is easier in South Africa to raise corn for export than to raise for export animals to which the corn might be effectively fed. South African exports to Great Britain are facilitated by favorable circumstances of transportation and by the political connection between the Union and the mother country.

els, with an average of 7.6 per cent of the crop exported. From 1900 to the outbreak of the war, exports were irregular and of about the same magnitude as before 1895, in two years over 100 million bushels and in one year below 11 million bushels. The war gave little impetus to the export of corn. After the war there was one year of heavy export, the fiscal year 1921-22. Since 1923 the exports have been small, averaging less than 1 per cent of the crop, except in 1928-29 when the exports were 1.5 per cent of the crop. The decline in exports since 1900 has been due in the main to two causes: free availability in Europe of feedstuffs, oil seeds, and other concentrates, and the rapid expansion of corn growing in other countries.

While the decline in export of corn has been striking enough, and significant in several directions, the export of the products of our corn acreage has by no means declined as heavily and as rapidly as would be indicated by the figures for export of corn as grain. We export more corn in the form of animal products than as grain. When our exports of cattle and hog products since 1880 are converted into equivalents of corn and these added to the exports of corn as grain, the picture looks substantially different. Even with lapse of export of cattle products, our exports of hog products still represent a large volume of corn. In the years directly preceding the war the annual export of hog products was roughly equivalent to some 6-7 million hogs.¹ Converting hogs back to corn, this number of hogs corresponded to over 150 million bushels of corn. Comparing this figure with the exports of corn during these years, it follows that much more American corn was exported as hog products than as grain. The trend of American exports of both corn and hog products to Europe was declining before the war; as Europe ex-

¹ This means direct comparison of weight; in fact, however, more hogs were required to yield the hams and bellies exported.

panded her feeding yards, she naturally chose to import feedstuffs rather than hog products, i.e., she sought for herself the profit of conversion of grain into animals—but she preferred to buy corn or other feedstuffs from other countries than the United States.

The exports of corn have, however, a larger meaning for the cash corn price than would be inferred from the proportions of the crop exported. The better comparison would be between corn exported and corn shipped out of the county where grown, or between corn exported and annual corn receipts at the principal terminal markets. But the reports of corn shipped out of the county where grown do not extend back far before the war; also, corn receipts at primary markets were not comparably reported before the war.

Table 7 contains for the five years before the war and for the past nine years the following data: the crops; the amount of corn shipped out of the county where grown; the receipts in ten primary markets and the monthly average visible supply; the total exports (as grain); the exports overseas;¹ and the percentage of corn receipts at primary markets represented in overseas exports.²

It is important to distinguish between exports to countries in the Western Hemisphere and exports overseas. Overseas exports of corn in the last five pre-war years were in one year as high as 45 million bushels and in one year as low as 2 million bushels. The exports during the year 1921–22 were abnormal and did not rest on

¹ The figures for overseas exports do not include any exports to Canada, the West Indies, or Central America.

² According to an estimate of the U.S. Department of Agriculture for the crops of 1924–28, inclusive, the largest amount of corn "sold or for sale" was 554 million bushels out of a crop of 2,916 million bushels; the smallest amount was 394 million bushels out of a crop of 2,309 million bushels. The average of the five years was 470 million bushels out of an average crop of 2,704 million bushels. That is, about 17 per cent of the reported corn crop was "sold or for sale."

TABLE 7.—UNITED STATES CORN CROP, SHIPMENTS OUT OF COUNTY WHERE GROWN, RECEIPTS, VISIBLE SUPPLY, AND EXPORTS, 1909-10 TO 1913-14 AND 1921-22 TO 1929-30*

Crop year Nov.-Oct.	Crop (million bushels)	Merchantable crops ^a (million bushels)	Shipped out of county where grown ^a (million bushels)	Receipts in ten primary markets (million bushels)	Monthly average supply ^b (million bushels)	Total exports ^c (million bushels)	Exports overseas (million bushels)	Relation of exports over- seas to corn receipts in ten primary markets (percentage)
1909-10.....	2,572.3	2,127.0	620.1	212.0	7.1	43.8	26.1	12.3
1910-11.....	2,886.3	2,492.8	661.8	231.4	6.8	62.4	45.1	19.5
1911-12.....	2,531.5	2,027.9	517.8	233.3	6.2	33.0	21.7	9.3
1912-13.....	3,124.7	2,654.9	680.8	255.1	8.1	48.4	38.1	14.9
1913-14.....	2,447.0	1,961.1	422.1	232.9	9.0	9.9	2.1	0.9
Average....	2,712.4	2,252.7	580.5	232.9	7.4	39.5	26.6	11.4
1921-22.....	3,068.6	2,684.6	587.9	375.4	25.9	166.1	114.4	30.5
1922-23.....	2,906.0	2,567.0	518.8	253.6	12.8	51.5	38.4	15.1
1923-24.....	3,053.6	2,467.8	600.7	274.1	10.2	20.1	9.3	3.4
1924-25.....	2,309.4	1,823.7	417.8	202.5	16.5	9.8	1.0	0.5
1925-26.....	2,916.1	2,238.9	578.4	226.2	22.6	23.7	7.8	3.5
1926-27.....	2,691.5	1,913.7	447.0	217.9	32.8	15.2	2.4	1.1
1927-28.....	2,763.1	2,019.8	501.7	290.5	24.0	19.5	10.4	3.6
1928-29.....	2,818.9	2,342.5	538.5	268.6	15.9	40.5	26.4	9.8
1929-30.....	2,614.1	2,010.3	442.4	231.9 ^d	10.5	7.7	0.2	0.1
Average								
1921-30.....	2,793.5	2,203.1	514.8	260.1	19.0	39.3	23.4	9.0
1925-30.....	2,760.7	2,117.0	501.6	247.0	21.2	21.3	9.4	3.6

* Data from *Agriculture Yearbooks, 1927, p. 782, and 1931, pp. 615, 622, and 624; Monthly Summary of Commerce and Finance; and Monthly Summary of Foreign Commerce*. Data for receipts in ten markets for 1909-14 furnished by Bureau of Agricultural Economics of U.S. Department of Agriculture.

^a Based on reported percentages of entire crop on farms, proportion merchantable, and percentage shipped out of county where grown.

^b Saturday nearest the first of each month.

^c Not including corn meal.

^d Preliminary.

commercial considerations; in 1922-23 they were still relatively high—38 million bushels. Since then, overseas exports of corn were below 10 million bushels until 1927-28, when they rose to 10.4 million; in 1928-29 they were 26.4 million bushels, but in 1929-30 only 0.2 million bushels. When one contrasts these exports with the figures for corn shipped out of the county where grown, to say nothing of the total crops, the decline in exports becomes clear. The decline in overseas export of corn is perhaps most strikingly shown in a comparison of overseas exports with receipts in ten primary markets, through which such export corn must have passed. Referring to the data in Table 7, we observe that in the five corn crop years before the war some 11.4 per cent of the corn receipts in the ten primary markets passed to overseas export. During the seven corn crop years 1923-24 to 1929-30 about 3.4 per cent of the corn receipts in the ten primary markets passed to overseas export.¹

European countries import corn for diverse purposes. A surprisingly large proportion goes to poultry; quite large amounts are used for the manufacture of alcohol and starch; most of the remainder goes to hogs and cattle. There is little consumption of corn as food north of the latitude of the Alps; in southern Europe, domestic corn is relied on for food except in the event of crop failure. American corn is dent corn; the corn of Argentina is flint corn. The flint corn of Argentina has naturally a lower moisture content than the dent corn of North America and usually offers a substantial advantage in soundness for shipment overseas. In the article on the corn crop in the 1921 *Yearbook* (p. 207) of the United States Department of Agriculture, the reasons for Euro-

¹ The low overseas export of corn for 1930-31 (about 0.3 million bushels) is not explained solely by the small crop of 1930. In 1929-30, as in 1930-31, our imports of corn were more than our overseas exports, though the crop of 1929, while low, was much larger than the crop of 1930.

pean preference for Argentine corn are given as smaller kernels, higher sugar content, and lower moisture content. It is also pointed out that in some seasons "price seems to have nothing to do with the preference for the South American product for at present Argentine corn sells for 8 to 10 cents a bushel more than American corn." But the Argentine corn is richer in fat than American corn.

Before the war large amounts of American corn went to the United Kingdom. The amount of American corn imported into the United Kingdom during the past five years is unimpressive in contrast with the importations from Argentina. The importations from Argentina, while tending to be lightest during the late spring and summer months, have continued to be surprisingly heavy throughout the year.¹

There exists, indeed, the possibility that the United States will become a seasonal importer of corn, unless controlled by high import tariff rates. During the summer, when the price of American corn is seasonally highest, that of Argentina is seasonally lowest. At this time Argentine corn can be laid down at a surprisingly low figure at both Atlantic and Pacific ports of the United States. In recent years such duty-paid importation of Argentine corn into this country has occasioned much adverse comment. When the Argentine corn price is low and the domestic corn price high, corn may be imported duty-paid for use in areas adjacent to the Atlantic and Pacific ports. The high oil content is a factor in importation. Since the war the United States imports and re-exports of corn, for the November–October crop years, have been as follows,² in thousand bushels:

¹ See Appendix Table X for monthly imports of Argentine corn into the United Kingdom since 1921.

² Data from *Monthly Summary of Foreign Commerce*.

	Imports	Re-exports
1921-22	107	26
1922-23	165	1
1923-24	3,545	2
1924-25	1,662	173
1925-26	578	15
1926-27	5,042	94
1927-28	1,436	324
1928-29	349	7
1929-30	1,262	1
1930-31	928	...

In the Tariff Act of 1930 the duty on corn was raised from 15 to 25 cents a bushel, which will serve to retard imports in the future. That a country leading all others in the raising of corn, and presumably afflicted with an un-exportable surplus, should import corn, seems to be regarded as a fact of considerable political importance, howsoever simple the technical explanation may be.

The developments to be expected in international trade in corn during the coming decade seem fairly clear. Argentina is still in the stage of expansion of corn acreage and will continue to dominate the market and furnish increasingly larger amounts if required by importing countries. Exports from South Africa may be expected to continue to expand. On the other hand, the trend of agriculture in the Balkan regions is in the direction of conversion of corn into animals rather than export of corn as grain. As to Russia, the prospects are conjectural; the impulse to export, on the part of both government and peasants, would seem to lie rather in the direction of bread grains than of corn. As a counter-influence of unknown proportions in Russia and in southern Europe, corn has lost favor as a foodstuff and is being replaced by the bread grains. Nothing in the international picture would seem to hold promise of a significant revival of overseas export of corn from the United States.

Exceptional circumstances are of course occasionally

to be expected. Disappointing yields of feed grains and other fodder crops in Europe increase European demand for feedstuffs from surplus-producing countries. Whenever a shortage of domestic feedstuffs in Europe occurs in a year of short corn crop in Argentina, demand for corn from the United States will be revived. This was the situation during the crop year 1928-29. Whenever the adjustment between European import demand and exporters' surpluses of feedstuffs outside of the United States is easy, export of corn from the United States will be at a minimum. Despite our geographical proximity to Europe, we have become the last rather than the first source of supply of corn for Europe.

EXPORT OF LIVE HOGS AND FRESH PORK

With the rapid westward expansion of agriculture led by extension of railways under a liberal policy of homestead settlement and the open range freely available for private use, a predominating development of agriculture after 1870 was in domesticated animals. Gradually, the growing farm population took up the best of the virgin soil and the plowman replaced the herder. With the progress of land settlement after 1870, this country became the outstanding source of international supply of hog products, a position directly attributable to the acreage of corn. With decline of the open range and growth of population, the United States became (before the World War) a net importer of the products of cattle and sheep; we remained, however, a heavy exporter of hog products.

Aside from border trade, our imports and exports of live hogs are limited to special cases. There is a large interstate movement of feeder swine in transit to feeding lots in regions of surplus corn. Tariff and quarantine regulations permitting, feeder cattle and sheep would come in substantial numbers from Canada and Mexico; but no corresponding movement would be expected for

hogs. The exports of live hogs, while greater than the imports, are relatively insignificant. The heaviest export was 158,581 in the fiscal year 1873-74. Since 1900 the export has been over 50,000 only seven times, but six of these times have been since the war. In 1920-21, 103,192 live hogs were exported, but in recent years the export has dwindled to practically nothing. Imports and exports of live hogs are without significance for the problem of the hog surplus.

Export of fresh pork—carcasses and cuts like loins destined for fresh consumption—is both technically and commercially feasible. Rapid dispatch of refrigerated cars from packing houses to seaboard, free availability of refrigerated space in liners sailing frequently, and expeditious transfer to refrigerated storage space in centers of consumption in importing countries combine to make international trade in fresh pork relatively feasible as a technical operation. Nevertheless, the trade does not prosper greatly and is always exposed to quarantine controls and discriminatory regulations. During the past ten years (July-June) American exports of fresh pork have been as follows,¹ in rounded million pounds:

1921-22	26	1926-27	11
1922-23	44	1927-28	11
1923-24	49	1928-29	11
1924-25	28	1929-30	19
1925-26	16	1930-31	11

These shipments have a wide distribution, the United Kingdom being the heaviest taker in Europe, with Cuba and Canada relatively heavy importers in the Western Hemisphere.

The United Kingdom is a heavy net importer of raw pork—fresh, chilled, and frozen. Before the war, the largest source of supply of fresh pork was Holland, with

¹ *Monthly Summary of Foreign Commerce*, June issues.

China predominating in supply of chilled and frozen pork. Since the war, large supplies of fresh pork have been brought in from Holland, Belgium, Poland, and Denmark, while the United States, Argentina, New Zealand, and Canada now exceed China as source of chilled and frozen pork. Up to the imposition of the embargo on account of foot and mouth disease in 1926, the imports of fresh pork were heavy—over a million hundredweight in 1925. Under the embargo, fresh pork has been denied entry into the United Kingdom from all the countries of continental Europe. The imports of chilled and frozen pork have run as high as 400,000 hundredweight, though the average taking has been considerably less. In 1923, 1924, 1925, and 1926, the United States led the list of exporters to the United Kingdom; but in 1927 we were surpassed by both New Zealand and Argentina. Chilled and frozen pork do not rank with chilled and frozen beef and lamb in the esteem of British consumers. Chilled and frozen hog carcasses from overseas, which do not rank with fresh carcasses from contiguous European countries when these are available, are used either fresh or cured. The British preference for hogs of a dressed weight of around 130 pounds limits that market for American producers. If the embargo against fresh Continental supplies persists, this may tend to stimulate hog production in Great Britain, rather than importation of uncured pork, and shift imports in the direction of cured products. The British embargo on fresh pork from the Continent has had the effect of increasing the proportion of Continental pork shipped to Great Britain in cured form.

The trade is important to packing houses, but has a different meaning from the trade in pork products. Doubtless susceptible of substantial expansion, it is hardly to be believed that during the next few years growth in the export of fresh pork is destined to have a material influence on swine husbandry in the United States.

EXPORT OF HOG PRODUCTS

The export of hog products demands a detailed examination which must cover a period of fifty years, since we attained prominence soon after the Civil War.¹ During the last three decades of the nineteenth century the exports of hog products expanded progressively. Table 8 contains in rounded figures the domestic exports of hog products for fifty fiscal years since 1879.

As early as the 'seventies, the exports of hog products passed the billion-pound mark. This level, however, was not maintained during the 'eighties. During the 'nineties exports became heavier and between 1890 and 1910 fell but twice below the billion-pound mark. The five years directly before the outbreak of the World War showed a substantial decline, and at that time the fear was widely entertained that our export of hog products, like cattle products, was on the road to extinction.² The war provided a stimulus for export, and the fiscal year 1918-19 showed the heaviest export in our history. Exports during the following five years remained heavy: the average volume during the fiscal years 1919-24 (1,680 million pounds) was the largest of any 5-year period. Following 1925 exports declined rapidly and in recent years have stood little over the billion-pound mark—in fact, in 1930-31 they amounted to only 770 million pounds.

The trend in export of hog products, relative to the population of the country and to the number of swine, is illustrated graphically in Chart 7, on which are plotted, on the logarithmic scale, the figures secured for each year

¹ As early as 1842, in the *Report of the Commissioner of Patents for 1842*, p. 42, the importance of export of lard to the future corn belt was prophetically forecast.

² Recession of exports during the 'eighties was in part the consequence of restrictive regulations in Europe. Again after 1900 quarantines and tariffs were raised against American hog products. The restrictions placed on the refining of lard by the federal inspection set up in 1907 depressed exports. Finally, from 1900 to 1913 American hog prices rose faster than European prices, which led Europeans to seek supplies elsewhere.

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TABLE 8.—EXPORTS OF PORK AND LARD FROM THE UNITED STATES, ANNUALLY, 1879-80 TO 1930-31, AND AVERAGES FOR FIVE-YEAR PERIODS*

(Million pounds)

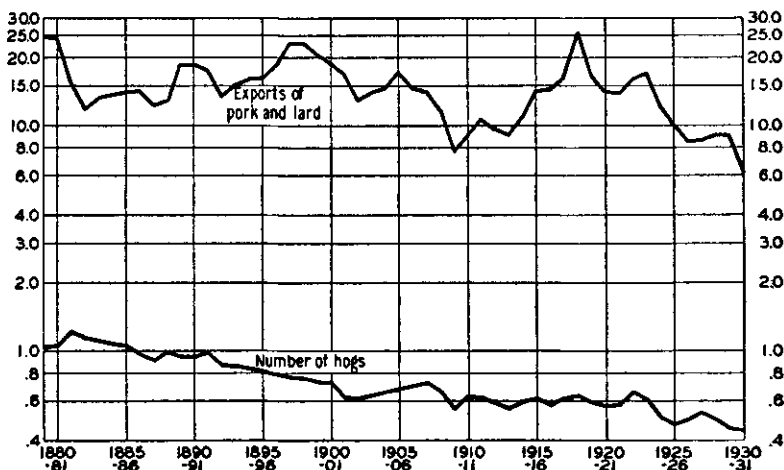
Year July-June	Exports	Year July-June	Exports
1879-80.....	1,231	1904-05.....	1,210
1880-81.....	1,233	1905-06.....	1,452
1881-82.....	799	1906-07.....	1,265
1882-83.....	627	1907-08.....	1,232
1883-84.....	715	1908-09.....	1,047
Average.....	921	Average.....	1,241
1884-85.....	755	1909-10.....	703
1885-86.....	801	1910-11.....	838
1886-87.....	827	1911-12.....	1,004
1887-88.....	732	1912-13.....	936
1888-89.....	783	1913-14.....	890
Average.....	780	Average.....	874
1889-90.....	1,160	1914-15.....	1,076
1890-91.....	1,180	1915-16.....	1,415
1891-92.....	1,126	1916-17.....	1,476
1892-93.....	893	1917-18.....	1,682
1893-94.....	1,016	1918-19.....	2,681
Average.....	1,075	Average.....	1,666
1894-95.....	1,092	1919-20.....	1,735
1895-96.....	1,134	1920-21.....	1,498
1896-97.....	1,302	1921-22.....	1,494
1897-98.....	1,660	1922-23.....	1,765
1898-99.....	1,678	1923-24.....	1,907
Average.....	1,373	Average.....	1,680
1899-00.....	1,530	1924-25.....	1,376
1900-01.....	1,453	1925-26.....	1,147
1901-02.....	1,328	1926-27.....	986
1902-03.....	1,029	1927-28.....	1,014
1903-04.....	1,137	1928-29.....	1,086
Average.....	1,295	Average.....	1,122

* Data from *Commerce and Navigation of the United States, Statistical Abstract of the United States, and Monthly Summary of Foreign Commerce*. The totals include hams and shoulders, bacon, fresh, salted, and pickled pork, and lard. Neutral lard, and lard compounds and substitutes are not included, though they contain varying amounts of hog fat. The earlier reports are less complete than the later reports. Sausage and canned pork are not included. Therefore the figures understate the facts slightly, but this is without significance.

The exports of pork and lard for 1929-30 were 1,109 million pounds and for 1930-31 they were 770 million pounds, the lowest since 1909-10.

CHART 7.—PER CAPITA EXPORTS OF PORK AND LARD COMPARED WITH PER CAPITA NUMBER OF HOGS ON JANUARY 1, IN THE UNITED STATES, 1879-80 TO 1930-31*

(Pounds; units; logarithmic vertical scale)



* Based on data in Table 8 and Appendix Table I. The export figures used are for the fiscal years ending in June, whereas the figures for the hog supply are for January 1.

by dividing the exports of hog products and the number of hogs by the numbers of the human population.

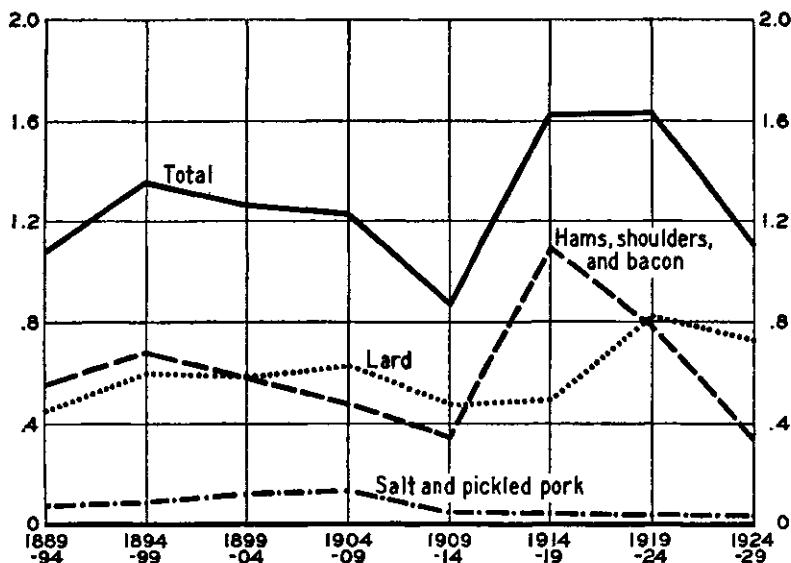
The gross figures for exports of all edible hog products give only a rough indication of the movement. The important information is obtained when the gross export is subdivided into particular hog products.

In Appendix Table VII are assembled the figures for domestic exports for forty fiscal years beginning in 1889, thus giving eight 5-year periods. The international trade during the war was of course abnormal. Separate figures are given for the high-grade cured products (hams, shoulders, and bacon), for the low-grade cured products (pickled pork and salt pork), and for lard, with totals

for each year. Values are given as well as amounts, with average prices per pound.¹ The amounts of exports are given in Chart 8.

CHART 8.—UNITED STATES EXPORTS OF HOG PRODUCTS, AVERAGES OF FIVE-YEAR PERIODS, JULY-JUNE, 1889-94 TO 1924-29*

(Billion pounds)



* Based on data in Appendix Table VII.

Exports of hams, shoulders, and bacon, already heavy in 1889, rose somewhat until 1897-98, but were much

¹ Neutral lard is not included, because prior to 1911 it was reported under "oleo oil." The volume is not insignificant, often as high as 20 million pounds per annum. There are two varieties of lard compounds exported, one containing animal fats, the other only vegetable oils. As high a quantity as 14 million pounds of lard compound containing animal fats was exported during the past five years. How much animal fat such compounds contain is not a matter of record. The reported exports of lard therefore understate the case, but not to an extent significant in the general problem.

lower between 1904 and 1909 and still more so during 1909-14. During the war the exports were doubled, rose to the record level during 1918-19, decreased appreciably during 1919-24, and then declined over one-half during 1924-29, with continued decline during 1929-31.

The exports of salt and pickled pork were relatively constant during the first ten years, then were considerably increased during the next two 5-year periods. During 1909-19 exports were lower than at any time following 1889 and have declined still more since 1919, being lowest of all between 1924 and 1931, lower than for any 5-year period during the last forty years.

Excluding the influence of the war, there has been a trend toward decline in exports of hams, shoulders, and bacon, and of salt and pickled pork; but for lard no such trend is visible, and the exports of lard during the past ten years have been higher than at any time during the period under review. The lard exports since 1924 have, however, been considerably lower than those during 1919-24.¹

Proceeding to more detailed examination, the export of hams and shoulders has been relatively well maintained while that of bacon has declined greatly. The

¹ Regarding proportions rather than absolute amounts, the following tabulation (based on the data in Appendix Table VII) gives the relation, in percentages, of the exports of hams, shoulders, and bacon, salted and pickled pork, and lard to the total exports of these products, in averages for 5-year periods since 1889. This table reveals clearly the relative decline in export of hams, shoulders, and bacon and the relative increase in export of lard. See also Table 6, p. 112.

July-June	Hams, shoulders, and bacon	Salted and pickled pork	Lard
1889-94	51.6	6.6	41.8
1894-99	50.2	6.2	43.6
1899-1904	45.1	9.4	45.5
1904-09	39.1	10.2	50.7
1909-14	40.1	5.5	54.4
1914-19	67.1	2.7	30.2
1919-24	47.5	2.3	50.2
1924-29	31.0	2.8	66.2

United States exports of hams and shoulders, compared with the exports of bacon, in averages for 5-year periods, have been as follows, in million pounds:

July-June	Hams and shoulders	Bacon
1889-90 to 1893-94.....	81.4	472.6
1894-95 to 1898-99.....	165.2	518.2
1899-1900 to 1903-04.....	209.9	361.7
1904-05 to 1908-09.....	208.2	271.9
1909-10 to 1913-14.....	166.8	182.5
1914-15 to 1918-19.....	367.9	729.4
1919-20 to 1923-24.....	284.0	495.1
1924-25 to 1928-29.....	181.8	161.2

What has caused this and is there prospect that we face loss of our pre-eminence as exporter of hams and shoulders as we seem to have lost it with bacon? Next, is there a trend in the export of pickled pork? Finally—and possibly most important of all, in view of the predominance of the lard type of hog in this country—is further continuation of a high level of export of lard to be anticipated? These questions are complex, including elements of trends of hog production in importing countries and expansion in competitive surplus-exporting countries, purchasing power of importing countries, varying levels of production costs, and changes in the dietaries of the importing and exporting countries involved.

In order better to understand the relations of the exports of American hog products, it is advantageous to separate the countries of destination into three groups: the United Kingdom, other Europe, and ex-Europe.¹ The exports to ex-Europe have a different meaning and bear-

¹ The countries of export destination do not entirely correspond to the countries of ultimate consumption, since both the United Kingdom and other Europe re-export American hog products to some extent, partly in the condition in which they are imported and partly re-processed. But no substantial error is introduced in using export destinations.

ing on the trade than those to the United Kingdom and other Europe.¹

In Appendix Table VIII are collected in this manner the classified exports of hog products for the five years before the war and for the years since 1921. Upon these figures rather than upon the data in Appendix Table VII are based the discussions that are to follow.

The first thing to be observed is that before the war we had relatively heavy exports of all classes of hog products, but they were unequally distributed regionally. The United Kingdom took about 86 per cent of hams and shoulders, 74 per cent of bacon, 21 per cent of pickled pork, and 36 per cent of lard. Other Europe took much less of hams and shoulders, bacon, and pickled pork, but more of lard. Ex-Europe took varying amounts of hams and shoulders and bacon, a relatively large amount of lard, and as much as 74 per cent of the pickled pork. The United Kingdom took the most lean pork and the choicest cured fat pork; ex-Europe took the least lean pork and the largest amount of low-grade fat pork. The United Kingdom and other Europe preferred lard over pickled pork, on the basis of price for fat content; ex-Europe imported pickled pork as fat, instead of hams, shoulders, and bacon as meats.

It is necessary to consider not alone the exports from the United States but also those from other surplus-producing countries. Since our exports of hams, shoulders, and bacon were predominately to the United Kingdom, it will suffice to limit the comparisons to that country.

¹The situation is confused by varying nomenclatures in importing and exporting countries. In the United States ham is the hind leg, cut short or long; the shoulder, also termed a "picnic ham," or simply "picnic," is the front leg, variously trimmed. In Great Britain, ham is either the front or hind leg, no matter how trimmed. But the Wiltshire cut, which includes both front and hind legs, is called bacon; also, other cured sides, such as Cumberland, which includes the front leg, are called bacon. In Great Britain, therefore, the terminology is one of cut rather than of anatomy; in this country the terms are primarily anatomical.

Table 9 contains sufficient figures to indicate the pre-war trend of imports into the United Kingdom.

TABLE 9.—TOTAL IMPORTS OF HAMS AND BACON INTO THE UNITED KINGDOM AND PERCENTAGES RECEIVED FROM THE UNITED STATES, DENMARK, CANADA, AND RUSSIA, 1890, 1900, 1910, AND 1913*

Year	Total imports (hundredweight)	Percentage from United States	Percentage from Denmark	Percentage from Canada	Percentage from Russia
1890.....	5,000,016	80.6	9.4	8.0	...
1900.....	7,443,908	74.7	19.7	13.1	0.1
1910.....	4,582,515	43.1	39.3	9.8	3.0
1913.....	5,712,885	44.9	40.9	5.9	3.7

* Data from Ministry of Agriculture and Fisheries, *Report on the Marketing of Pigs in England and Wales* (Economic Series No. 12), London, 1926, pp. 3-4.

The outstanding feature is the decline of American products on the market of the United Kingdom and the increase especially of Danish products. Regarding the changes in imports of Canadian and Russian products as offsetting each other, we observe the decline of American imports, between 1890 and 1913, from 80.6 to 44.9 per cent, and the increase of Danish imports from 9.4 to 40.9 per cent. This corresponds to the substitution of something like 200 million pounds of Danish products for American products. This is so outstanding a transition in trade as to deserve a detailed examination in order that the significance and implications may be correctly appraised. The situation in Great Britain can be adjudged, however, only through an understanding of the circumstances attending pork consumption in that country before and since the World War.

The meat supply of the British people has always included a heavy consumption of pork products. Before the war the supply of pork products in the United King-

dom corresponded to some 807 thousand metric tons, contrasted with 597 thousand metric tons of mutton and lamb and 1,311 thousand metric tons of beef and veal.¹ Of the total supply of hog products, about half was imported. The largest part of the importations represented cured or processed products, though a substantial importation of fresh carcasses, frozen and chilled, came from western European countries, North America, and even from distant China. The United Kingdom was by far the largest market for hams, shoulders, and bacon from the United States, though exceeded as a market for pickled pork by ex-Europe and for lard by other Europe.

For decades before the war, the trend in public taste was in the direction of smaller and leaner animals.² As elsewhere, bacon had come to replace pickled and salt pork. The favorite weight of the "porker," consumed fresh, ranged from 100 to 130 pounds; the weight best adapted to the popular Wiltshire side was around 200 pounds. The market was fastidious about weight, conformation, and quality of hogs; and since animal husbandmen adapted their methods only with reluctance to meet the public taste, imported supplies readily acquired a popularity when they conformed to public taste. Thus, exporting countries in a position to adapt their methods to British consumers' standards made heavy inroads on the market. Danish producers created a new market for high-quality, mild-cured, freshly smoked lean bacon.

This explains why, from 1890 onward, Danish bacon supplanted American bacon in British esteem and took command of that market to such an extent that before

¹ T. B. Wood, *The National Food Supply in Peace and War* (Cambridge, England, 1917), pp. 4-5.

² "As is the case with other kinds of meat, the consumer nowadays demands small cuts. . . . In recent years, public taste has become more fastidious, and, taking the country right through, the popular demand is undoubtedly for lean pork."—Ministry of Agriculture and Fisheries, *Report on the Pork and Bacon Trades in England and Wales* (Economic Series, No. 17), London, 1928, pp. 23 and 25.

the war the ruling price of bacon in the United Kingdom was factually set by Danish bacon. Over the same interval, however, the American exports of hams and shoulders, as well as of lard, were maintained. The difference lay largely in technical considerations.

The word "bacon" has in Great Britain a different meaning from that in the United States. We term bacon the cured, and usually smoked, clear belly of the hog, having a length, breadth, thickness, and weight depending upon the age, type, weight, and conformation of the hog. In Great Britain, when the entire side, or half of the side, of the dressed carcass of the hog is cured, it is called bacon. The Wiltshire-cut side is the most common form of bacon in Great Britain.¹ There is also the so-called Midland system of cutting and curing, adapted to somewhat larger hogs, resembling the practice in the United States. The legs are cut off and the clear belly (or the belly, side, and back) is cured. The customary Midland cure is usually stronger than the mild Wiltshire cure.

Before the war, American exports of bacon were largely of the short Midland type, both as to cut, weight, and cure, and competed with Midland bacon in the retail markets; only to a small extent were special cuts like Wiltshire and Cumberland prepared for export to Great Britain. Aside from Wiltshires, American bacon was the one most seen on the import market. The competitors

¹ The Wiltshire-cut side is produced by severing the carcass down the middle, removing the viscera, backbone, bladebone, aitchbone, leaf fat and kidney, tenderloin, head, feet, and tail, and trimming the fore-end and side; the whole is then cured. A prime Wiltshire side weighs 55-65 pounds, has specified points of excellence, especially with reference to length of side, lightness of shoulder, depth of back-fat, and appearance of skin. The maximum depth of fat should not be over two inches and the side should be long in the central part where the high-priced rashers are located. It is usually cured with a dry salt mixture and smoked. It is graded by "brand" and "selection"—being "full branded," "half branded," or "unbranded." The "selections" are sub-grades based largely on relative proportions of lean and fat, prices favoring the lean. The Wiltshire is retailed by parts or slices. The Cumberland represents the front quarter and the side, i.e., it roughly corresponds to a Wiltshire with the ham removed.

of the United States prepared their exports largely in the form of Wiltshire sides. Not only this, but they aimed at the highest quality. This was particularly true of the Danish exports, but also held for Canadian exports. Hog breeding in those countries came to have as its objective the production of the bacon-type hog that would give the desired Wiltshire side. Americans continued to develop the lard type hog. Midland-type bacon in Great Britain tended to be second-class bacon, while Wiltshire bacon tended to rank as first-class bacon. The Danes, and later the Canadians, went in for the Wiltshire trade; American packers were largely restricted to the Midland trade, principally on account of scarcity of bacon-type hogs adapted to the Wiltshire cut.

The Danes were greatly favored by their geographical location.¹ With low cost of transportation and minimal requirement for chilling, they possessed an enormous advantage. This advantage they utilized not merely in the selection of the type of animal, but also in the perfection of mild curing. In fact, it is not an exaggeration to say that the present British taste for mild bacon was in part developed by the use of Danish bacon. The very best bacon was made in England and in Ireland, but the volume of highest-grade domestic bacon was small; the Danish bacon, while only slightly inferior to the best domestic bacon, was uniform and available in large volume. It was mostly shipped in green, and the cure finished to suit the trade. Thus, it gradually crowded American bacon to the wall on the British market. In the meantime the Canadians, copying British and Danish methods (except for adaptations imposed by distance), were scarcely able to maintain their exportations.

The continuing export of American hams and shoulders was in the main due to the fact that these appealed

¹ But geography alone was not the explanation, as is indicated by the failure of Holland to achieve success in the British bacon market.

to a particular trade; also, the other countries engaged in supplying Great Britain with cured pork products shipped the legs with the bacon, in the form of Wiltshire sides. The retention of the British market for American hams was, therefore, partly the expression of a trade classification. The domestic hogs cut in Great Britain for the Midland type of bacon furnished parts to be cured separately as hams and shoulders, and particular methods of curing them had long been established. The York ham, cut, trimmed, and cured in established ways, represented the most widely esteemed type of British ham. Only a relatively small fraction of the carcasses cut for the Midland cure of bacon was good enough to furnish hams of the York quality, which therefore enjoyed a restricted high-priced market.

Although sound from the standpoint of sanitation and equally good under a nutritional definition of meat, but inclined to fat rather than to lean, American hams and bacon were generally regarded in Great Britain as second-class on the basis of a fastidious classification based on type, conformation, and cure. For this position, no blame attached to American packing houses, since they had to cut their products according to their carcasses. The majority of English curers did not turn out a first-grade article; it was the particular achievement of the Danes to have reorganized and developed their industry on the level of the high-grade British product.

American lard, also, was not regarded in Great Britain as a first-grade product. It was mostly prime steam lard, shipped in tierces, a sound but not uniform lard. Such lard did not, in our country, meet the high standards set by the special brands of the packing houses; similarly, it did not, abroad, rank with the best lards.

To a large extent, American hams, shoulders, and bacon were shipped green, semi-finished, rather than finished. There was also a box trade in dry cured bacon and

ham. Export in the green state, dry, or in pickle, was not merely the cheapest method of shipment, it was also the most adaptable to the requirements of the importing market. Importing houses, wholesalers, and curers finished the cure; the cuts were dried and smoked according to the type and quality of the material and the tastes of the consuming market. American lard, also, was to a large extent re-processed and refined in Great Britain and not infrequently mixed with other imported lard or with domestic lard.

Our export trade with other Europe before the war stood upon a different footing. No Continental country imported so heavy a proportion of its hog supplies as did Great Britain. Of the countries north of the latitude of the Alps, Germany alone was a heavy net importer, principally of lard. Old Austria-Hungary and the Balkan states were self-sufficient, though considerable border trade passed inward and outward at different points. Norway, Finland, and the present east Baltic states had minimal import requirements; the region included in the present Poland was a net exporter. The lowlands took occasional amounts. The countries lying south of the latitude of the Alps and west of the Adriatic Sea were not heavy consumers of hog products, though there was considerable trade in areas bordering on the Mediterranean. In Europe, outside of the United Kingdom, therefore, the United States possessed only a moderate trade, but it faced less competition there than in the United Kingdom. Rather notable amounts of American hog products were re-exported from the United Kingdom to other European countries, so that the net consumption of these products in other Europe was larger, and in the United Kingdom smaller, than is revealed in the reports of commerce.

The war effected profound changes in import and export positions. The neutral countries of Europe, lack-

ing the customary feedstuffs, were compelled to reduce their herds. Production of animals in the Danube valley declined and export from the region practically ceased. Export of pork and other animal products from Russia ceased in 1917. The bilateral blockade deprived Denmark, Sweden, and Holland of most of their export trade. Unable to secure feedstuffs from overseas, Germany was forced to reduce her domesticated animals. With their agricultures crippled and the seas open for imports, the Allies enlarged their dependence on foreign supplies. A goodly proportion of the war orders of the British government were in the form of Wiltshire sides, since these represented for the British the most economical form for distribution. Following the Armistice, large amounts of hog products were sent into the countries of the late enemies, and into eastern Europe and Russia.¹

In a consideration of the post-war situation, changes in boundaries and other circumstances have modified somewhat the relative positions of different European countries, but the error in comparability thus introduced is not serious.

One of the earliest trade reactions after 1919 was the decline in exports of hog products, particularly since Germany did not return as importer as effectively as Great Britain withdrew.² Thus United States exports fell from 2,681 million pounds³ in 1918-19 to 1,494 million pounds in 1921-22. In 1922-23 and 1923-24 exports rose

¹ Cf. F. M. Surface, *American Pork Production in the World War*.

² Owing to arbitrary regulations, bureaucratic blundering, and difficulties in transportation that need not be gone into here, American bacon lost some of its good repute in Great Britain during the war. It is therefore now urged that this has contributed to the supplanting of American bacon by Danish bacon in British markets. There is something in the suggestion, but it fails in the face of the fact that Danish bacon was supplanting American bacon in Great Britain before the war. The Danes have great natural advantages in type of hogs, proximity, and favorable climate; in addition, they have perfected a cure that fits the British taste. The war may have given American bacon a poor repute, but it was not the war that gave Danish bacon a good repute.

³ See above, Table 8 (p. 140).

again, though not to the level of 1918-19, thereafter declining rapidly. The extent of the decline in about twelve years is made evident by comparing exports of 2,681 million pounds in 1918-19 with exports of 770 million pounds in 1930-31. In the five fiscal years 1909-14 the average value of exports of hog products from the United States to Europe and the United Kingdom was about 85 million dollars per annum; when the values of the corresponding exports for the five calendar years 1926-30 (about 112 million dollars) are reduced to 1913 dollars, it is found that the average value was only about 77 million dollars per annum.

The post-war recovery of animal husbandry in Europe has been gradual, and in the interval Europe has been importing amounts of animal products that would have been regarded as superfluous before the war. These large imports have tended to tide over the period of recovery. This recovery had depended partly on breeding stock, but to a considerable extent on the purchasing capacity for feedstuffs. In every exporting country the mistake has been made of assuming that the heavy post-war imports of Europe would be permanent—disregarding the outstanding fact that the incentives that led Europe before the war to expand animal husbandry would compel her after the war to re-establish it. The accepted policy in most European countries is to raise bread grains, import feed grains and other feedstuffs, and develop animal husbandry. For practical purposes, it is correct to state that the re-establishment of animal husbandry in Europe (ex-Russia) has now been accomplished, although the imports of the Continent have not yet retreated to the pre-war level. This is because the average outturn per animal is still somewhat reduced by shortage of concentrated feedstuffs. But restoration will soon be complete.

The net exporting countries of Europe (of note) are now Sweden, Denmark, the Irish Free State, Holland,

Poland, Jugo-Slavia, Italy, and Roumania; the net importing countries are the United Kingdom, Norway, Finland, Germany, Switzerland, France, Czecho-Slovakia,¹ and Austria. In most countries the hog count is near to or above the pre-war level; but outturn of hog products per head is below normal in many countries and further expansion is to be anticipated. The transition in Germany from relative shortage in 1925 to relative glut in 1927 illustrates how quickly the position may change. Denmark, the United States, Canada, the Netherlands, and the Irish Free State are the largest factors in the international pork trade and contribute over 90 per cent of imports into the United Kingdom, which is the largest single market. Of their productions of cured hog products, Canada exports 75 per cent, Denmark 65 per cent, the Irish Free State 60 per cent, Sweden 40 per cent, and the United States less than 10 per cent, using rough estimates for illustration.

Following the decline in 1919, American exports of hams and shoulders rose to large volume during 1923-24 but have declined since (see Appendix Table VIII). Over 80 per cent of these exports goes to the United Kingdom; of the remainder, over two-thirds go to ex-Europe. The exports of bacon rose also during 1923-24 but have declined heavily since, both to the United Kingdom and to other Europe, with less decline to ex-Europe. The exports of pickled pork have been lower than before the war, with the United Kingdom taking relatively less, other Europe relatively more, and ex-Europe about the same. The export of lard reached in 1923-24 the highest point known, but since falling heavily in 1924-25 it has remained relatively stationary until 1930-31; the United Kingdom has taken relatively less than before the war, other Europe about the same, and ex-Europe more.

¹ Though Czecho-Slovakia is a net importer of pork and bacon, she is a net exporter of hams. Imports and exports are about balanced in Spain.

The situation in the United Kingdom merits particular attention. From 1923 to 1925, the production of pork increased nearly 40 per cent, about half the domestic pork being consumed fresh. Also, imports have increased, and now run over 12 million hundredweight, compared with around 8 million before the war. Since, according to the best available information, the supplies of beef, veal, mutton, and lamb have recovered the pre-war level, the increase in consumption of pork products represents an increase in the annual per capita consumption of what the British call "butchers' meat." Pork has increased in popularity, with preference for the choicest cuts and the most delicate cures shown even among poorer classes, the consumption of pig meat having increased from something like 35 pounds to nearly 45 pounds per person per year.¹ Even more than before the war, the taste of the British public runs to low weights, lean animals, small joints, and mild cures of pork. New Zealand, Australia, and South Africa, on account of distance, cannot place mild-cured bacon on the British market but must ship chilled or frozen pork for fresh consumption or processing after arrival. As before the war, the Danish and American cured products predominate in British markets. The Danes have rapidly recovered their bacon trade, while that of the United States has declined, just as was the case before the war. Imports of lard into the United Kingdom, largely of American origin, have expanded to

¹ Despite industrial difficulties in Great Britain, demand for animal food-products is heavy. Nevertheless, demand is regarded as elastic and independently variable from one meat to another. "On the whole, it is true to say that demand in the meat trade is very elastic and varies from hour to hour, from day to day, from week to week, from month to month, from season to season, and from year to year. . . . the trend of pork prices differs from the trends of beef and mutton prices, which more nearly correspond with the secular movements of wholesale prices generally; pork prices reflect the cyclical fluctuations which are so marked a feature of pig production in this and other countries."—Ministry of Agriculture and Fisheries, *Report on the Pork and Bacon Trades in England and Wales* (Economic Series, No. 17), London, 1928, pp. 22 and 28.

some 30 per cent above the pre-war level, with a sharp decline in 1930-31. In 1930 our share of the imports of bacon and ham into the United Kingdom was less than 13 per cent, the lowest since the war. The course of the trade with recovery from the business depression is conjectural, with no odds in our favor.

From Appendix Table VIII the probable trend becomes clear. The takings of lard¹ continue to be high; the takings of hams, though declining, persist in large volume; but the takings of bacon seem destined to sink into relative insignificance. Possibly Canada, Denmark, and Sweden may later invade the market for hams as they have done for bacon. The preponderance of the United States in the ham and shoulder trade and of Denmark in the bacon trade are both fictitious in a sense, since Denmark exports hams and shoulders attached to the side under the name of bacon, while we export the detached legs and bellies under their separate names. Therefore, a fairer picture is presented by combining the United Kingdom imports of hams, shoulders, and bacon from the United States and Denmark, as in Table 10.

Bearing in mind the expanding, if somewhat fluctuating, imports into the United Kingdom, the striking feature of the trade is the decline of importation from the United States and the corresponding increase of importation from Denmark. The Danish supplies are not compensatory in the sense that we have failed to offer supplies; instead, they have supplanted us by offering supplies which are preferred over ours and are therefore imported instead of ours.² American packers had

¹The exports of all hog products declined sharply in 1930-31, possibly as a cyclical phenomenon, with lard the least affected.

²"American pigs, being principally maize-fed, are of the lard type and, in the main, unsuitable for converting into bacon of the standard and quality consumed in this country."—Ministry of Agriculture and Fisheries, *Report on the Marketing of Pigs in England and Wales* (Economic Series No. 12), London, 1926, p. 24.

TABLE 10.—TOTAL IMPORTS OF BACON, HAMS, AND SHOULDERS INTO THE UNITED KINGDOM AND IMPORTS FROM THE UNITED STATES AND DENMARK, AVERAGE 1909-13 AND ANNUALLY 1921-30*
(Hundredweight)

Year	Total imports of bacon, hams, and shoulders	Imports from United States		Imports from Denmark		
		Bacon	Hams and shoulders	Bacon	Hams and shoulders	Total
Average 1909-13	5,481,083	1,763,105	841,442	2,075,980	1,868	2,077,848
1921	6,804,875	2,509,379	1,020,718	1,849,885	236	1,850,121
1922	7,365,394	2,463,368	1,320,559	2,363,736	432	2,364,168
1923	9,540,241	2,828,662	1,620,312	3,530,561	392	3,530,953
1924	9,509,399	1,833,824	1,475,228	3,987,160	720	3,987,880
1925	9,002,912	1,489,938	1,309,408	3,738,834	981	3,739,815
1926	8,666,467	1,189,247	1,000,362	3,641,578	1,955	3,643,533
1927	9,370,696	641,438	716,104	5,090,785	2,622	5,093,407
1928	9,794,909	537,859	759,831	5,375,793	1,941	5,377,734
1929	9,306,909	634,594	841,669	4,977,026	1,322	4,978,348
1930 ^a	10,195,460	478,340	821,160	6,117,860	.....	.....

* Data from Ministry of Agriculture and Fisheries, Report on the Marketing of Pigs in England and Wales (Economic Series No. 12), London, 1926, pp. 99-100; and Annual Statement of the Trade of the United Kingdom, 1923, II, 17-18, 1927, II, 21, and 1928, II, 16. Data for 1930 furnished through the kindness of the Ministry of Agriculture and Fisheries.

^a Preliminary.

^b Data not yet available.

the supplies to export 4.4 million hundredweight in 1928 as well as in 1923; but our offering was cut down to less than a third of that figure, because the Danes were able to increase their offering. In effect, Great Britain buys all that Denmark has to offer and thereafter takes from the United States only as much more as is needed. If importations from Denmark were to rise farther, importations from the United States, other things being equal, would sink in consequence. The Danish Bacon Company is the largest distributor in Great Britain. On each Friday in the London Provision Exchange public prices are set on Dutch, Swedish, Danish, Irish, and Canadian bacon, but not on American bacon. The price of standard Danish bacon is now the basic factor in the British market, since the bulk of Danish Wiltshires grade as "full branded," and are of desirable "selection."

Since the war our exports of hams and bacon to Europe, and especially to the United Kingdom, have been largely green or semi-cured, shipped under refrigeration; a small volume is box-cured. Cuts exported unfinished are to receive the completed cure in the country of importation. The American hams and shoulders have continued to enjoy a large popular trade in hotels, restaurants, meat shops, and grocery shops, sold both raw and cooked, and by the slice as much as in bulk. The war experiences had taught the American packers more about European tastes and had taught the present generation of Europeans more about American hog products.¹ It was

¹ Cured pork products—hams, shoulders, and bacon—dried or smoked, are shipped in boxes or bales and stowed in the hold, between decks, or in refrigerated space, according to circumstances. Green hams, shoulders, bacon, and special sides, or the same in sweet pickle, are shipped in boxes, bales, barrels, or tierces, according to circumstances, in refrigerated space. Pickled pork is shipped in barrels or in boxes, bales, or tierces, according to circumstances, and as commonly cured usually requires no refrigeration. Lard, usually shipped in tierces, requires no refrigeration. Packing and inspection specifications in this country and in the importing countries, together with varying circumstances of transportation, have considerable influence on c.i.f. costs. The stronger the salting, the heavier the smoking, the greater the use of preservatives, and the easier the

therefore anticipated that American hams, shoulders, and bacon would command a larger trade than they did before the war. A new development, however, has served, among others, to restrain this outcome.

A change in sanitary regulations in the United Kingdom now operates to the injury of American export trade in hog products. Until 1927 the food regulations in the United Kingdom permitted of the use of boric acid as a preservative under certain conditions. The use of boric acid in the curing of meats was prohibited in the United States over twenty years ago, but the prohibition was long deferred in the United Kingdom, being finally applied in 1927. Prior to that time hams, shoulders, and bellies exported to Great Britain in a semi-finished state, to receive there the final curing, were preserved with boric acid. The right to the use of boric acid greatly facilitated such exports. When the right to use boric acid was prohibited, the American packers had to choose between a lower refrigeration, risk of spoilage, or using a cure too strong for the British taste. Deprived of the use of boric acid, the risk of export was increased, the cost elevated, and the quality reduced. The American packers could turn to the box trade in finished cured products, but there are obvious limitations to this market. The boric acid regulation applied to Canadians as well as to Americans, but in the nature of their product involved them less severely. The producers in Denmark, Sweden, Holland, and Ireland were not injured by prohibition of the use of boric

dispensability of refrigeration, the cheaper becomes the cost of transport. But the trend is in the opposite direction, since light salting and mild curing are preferred, the use of preservatives is gradually being prohibited, and refrigeration made more generally necessary. Distance from consuming markets thus becomes an impost and the surplus-producing exporting countries of Europe have an advantage over the United States, just as the United States has an advantage over Argentina, New Zealand, and South Africa. Fully cured bacon and ham are exempted from the prohibition of importation from continental Europe, provided the curing has been done according to specifications and every piece furnished with an appropriate label of the country of origin.

acid, because the distances are so short that shipments can be cheaply effected without the use of preservative. Prohibition of boric acid on hams prevents accumulation of stocks in the United Kingdom and tends to a flow of imports through the year in accordance with seasonal demand. Without the use of boric acid, these European exporting countries continue to supply bacon, hams, and shoulders with a mild cure, whereas without the use of boric acid the mild cure has become more difficult and more expensive for American packing houses. Unless some new technical device intervenes, the boric acid regulation possibly means the future restriction of American exports to products with a finished cure.

There is considerable export of hog products from the United Kingdom. Little of it comes from animals raised in the islands. For the most part, the exports represent American material brought in green or pickled and given the finishing cure and packing in British establishments. To some extent, American-cured products are re-exported from the United Kingdom; but, apparently, British processors can take American hams, shoulders, and bellies and finish them to suit the tastes of particular importing markets in more or less distant countries more successfully than the American packing houses. Lard is re-refined and often blended with domestic or other imported lard. The added value of manufacture accrues to the British under these circumstances. Appendix Table IX contains the data for the exports and re-exports of bacon, hams, and lard from the United Kingdom during the past nine years.

The prospect for maintaining export of hog products is not encouraging, certainly not at price levels regarded as satisfactory in the corn belt. Nevertheless, the existing volume is highly important, in respect both to production and price. For hogs, the volume of products exported is still large enough to make reasonable the inference that

exports significantly influence domestic prices. To determine the influence of world prices on domestic prices, it is necessary to appraise the several factors entering into the market prices and these we shall consider in the next chapter.

SUMMARY

Our exports of corn have declined from a relatively large volume in the late 'nineties representing a substantial portion of the crop, to a small volume representing an insignificant fraction of the crop during the last five years. The average exports of corn in 1925-30 were less to overseas countries than to countries in the Western Hemisphere.¹ Signs forecasting increase in exports of corn are not in evidence. The corn exports of the future will come from Argentina, South Africa, Russia, and the Danube states, except in the event of a fortuitous set of crop circumstances.

Our exports of hog products, though declining, are still large; the average export of the past five years is still somewhat above the average export of 1909-14. It would not be hazardous to predict that the exports of the next five years will decline to the low level of the five years before the war. Looking over the last forty years, one observes that the exports of hams, shoulders, and bacon have declined heavily, while those of lard have increased, both relatively and absolutely. Our exports of hog products are to be divided into those to the United Kingdom, to other Europe, and to ex-Europe, and for each of these destinations separated into hams and shoulders, bacon, pickled pork, and lard. Our exports of hams, shoulders, and bacon have been predominately to the United Kingdom, and these have suffered heavily, largely through replacement with Danish products. Lard has

¹ See Table 7, p. 132.

always been prominent in our exports to Germany, and this trade has been surprisingly maintained; indeed, our average export of lard since 1921 has been much heavier than before the war. Probably further decline is in prospect in respect to exports to the United Kingdom and also other Europe, but not to ex-Europe. The data in Tables 8 and 10 suggest that our exports of hog products are likely to fall below the billion-pound mark. What the corn belt must face is the question whether it pays to export lard at little more than the price of live hogs if the export of the higher-priced cured products cannot be maintained.

CHAPTER V

DOMESTIC AND INTERNATIONAL FACTORS IN PRICES OF CORN AND HOGS

Introduction: Prices of wheat and cotton—Factors determining the price of corn—Influence of European price on American price of corn: Summary—The price of hogs: Secular trend of hog prices; Cycles of hog prices; Seasonal movement of hog prices; Short-term fluctuations of hog prices; Market grades of hogs; Relation of prices and receipts; Hog prices and slaughter under federal inspection; Influence of futures prices on cash prices; Hog prices in Germany; Influence of price on consumption; Summary—Influence of European price on American price of hogs—Prices of live hogs at home and abroad—Prices of hog products at home and abroad: Hams and bacon; Pickled and salt pork; Lard—Summary

INTRODUCTION

For some agricultural products the domestic price moves with the world price; for other products no such obvious relationship obtains.¹ A commodity may shift from one class to the other. When the price of any agricultural product changes, the question directly arises as to whether this is the result of relations between domestic supply and demand, or of relations between international supply and demand. The question is both theoretical and practical; to a considerable extent, the trustworthy interpretation of the economic position of a particular branch of agriculture rests upon our ability to separate and measure foreign and domestic price influences. Proposals for the improvement of agricultural prices differ, depending on whether the causes of low prices are domestic or international. The first thing, therefore, in a

¹The relation of domestic to international prices constitutes a large part of the subject of international trade. A modern treatise is that of James W. Angell, *The Theory of International Prices* (Cambridge, Harvard University Press, 1926). We are here dealing with changes in individual prices, not change in the price level.

consideration of the disability of corn growers and hog raisers is to determine the causes of the relatively low prices received for these products since the war, and especially to determine to what extent circumstances in world price and in international trade may have been responsible for the low prices. To open the discussion, it will be advantageous first to consider as examples wheat and cotton.

PRICES OF WHEAT AND COTTON

Wheat and cotton illustrate (but do not strictly reflect) two different positions. In the case of wheat, we export a substantial fraction of our crop at a range of world prices largely determined by the supplies of other countries, and, through exchange trading, reflected back, broadly but not minutely, upon a large part of the domestic crop. In the case of cotton, we are the largest producer and consumer of the fiber; the American exportable surplus is the largest single factor in the world supply, and the American price, broadly speaking, determines the world price. These statements are not to be taken literally, nor are all agricultural exports to be classified into one of the two groups; but these cases serve as examples.

A surplus is disposed of in one of several ways: wasted, degraded to lower uses, exported, or carried over into the new crop. In the case of corn (beyond feeding animals to heavier weights), degradation is practically limited to burning it as fuel or fermenting it to industrial alcohol. Carrying over a really large amount of corn into the new crop is impracticable because only unusually dry and good corn can safely be carried over. In the case of hog products, degradation to lower uses would mean making soap out of the fat and converting the flesh and skeleton into tankage. To carry over a large amount of hog products is impracticable on account of the expense of cold storage.

So long as any farm product is exported in substantial volume (so runs the familiar statement), the price for which the export fraction is sold reacts directly upon the price for which the domestic fraction is sold, and the price of the surplus tends to fix the price of the crop. The position is commonly overstated in the dictum that the world price fixes the American price. Applied to wheat, it runs to the effect that the world price of wheat is *determined* or *fixed* in Liverpool, inferentially without influence from the United States; and that the farm price of wheat on every American wheat farm is the price of wheat at the moment in Liverpool (as of variety, grade, and quality), minus charges for freight, insurance, handling commissions, and profits of middlemen.¹

Such a formulation is inaccurate and overdrawn. The world price of wheat is not a point, or a datum line, at Liverpool; it is not a c.i.f. figure originated at Liverpool that exporting countries accept or decline. The world price of wheat is a range of prices, with relatively wide variations between varieties and grades. Within the price range are equated the influences of statistical data and traders' opinions on world crops and world needs, on importers' requirements and exporters' surpluses, and on crop prospects. Sometimes the market has the complexion of a "sellers' market," at other times that of a "buyers' market"; sometimes the adjustment is close, sometimes easy. In the long-time view, it is as correct to say that the Liverpool price of wheat is the price in Winnipeg plus freight, insurance, commissions, and profits of middlemen as to say the converse; each statement is correct in a sense, each incorrect in a sense. The equation of supply

¹ For a critical but just disparagement of the customary view, see G. F. Warren and F. A. Pearson, *Interrelationships of Supply and Price* (Cornell University Agricultural Experiment Station Bulletin 466), March 1928, pp. 54-68. ("The assumption is often made that some one central market dominates prices and that other markets have a definite ratio to this market. This is far from true," p. 62.)

and demand in price at Liverpool is the result of a series of bilateral relations and reactions in importing and exporting countries. Liverpool does not pull Chicago up or down, any differently from the way in which Chicago pulls Liverpool up or down; Liverpool and Chicago react on each other and prices rise and fall within the range. The world price of wheat (defined outside of the United States) does not *fix* the American price unilaterally, since American supplies are one of the potent influences in determining world price. The price of wheat in each exporting country contributes a varying influence to the world price level and lies within the range of world price, freights, etc., considered. The price of wheat in each importing country contributes an influence to the world price level and lies within the range of world prices, freights, etc. (including tariff duties), considered. The bullishness and bearishness of holders influence prices. The several factors act quickly and effectively through trading in futures on established grain exchanges. If we were wholly on a domestic basis for any farm product behind the tariff wall, within limits the world price would not affect the domestic price. Now, so long as we are actively exporting, the world price influences the domestic price to some extent, since the export and domestic fractions mingle on the markets and exchanges; but world price is *one* influence, not necessarily *the* determining one.

Not only does this interpretation hold for terminal wheat prices in the prominent importing and exporting markets, but the qualification applies still more to farm prices. No one can take farm prices in importing and exporting countries and, after adjustments for transportation charges and tariffs, obtain a series of wheat prices resembling a ratio relationship. The terminal wheat prices lie within a range, and the farm wheat prices lie within a still wider range, subject from season to season to numerous influences differing from country to country.

In the case of wheat, we have a fair concordance of the ranges of domestic terminal prices with foreign terminal prices. The concordance would be closer if we had no tariff. The tariff is more or less effective for certain American wheats in all years and for all American wheats in years of short crops of all types. It is most effective for representative wheats of esteemed grades, least so for undesirable varieties and lower grades. Through the action of the tariff, the range of American wheat prices lies higher (usually but not always) than that of comparable Canadian wheat. The price of one American wheat may be consistently above the export level; the price of another wheat may be consistently on the export basis; or the price of a particular wheat may be alternately on the domestic or export basis throughout a season. But with allowances for the effect of the tariff and for the differences in the several varieties of wheat grown in the United States, the range of wheat prices in this country tends to move in relation to the range of wheat prices abroad.

In the case of cotton, the relationship is substantially different. European and ex-European import demands for cotton are equated primarily with the export supply of American cotton, secondarily with the export supplies of other countries. Adequate consideration of this circumstance and a survey of cotton prices over the world make it clear that it is both incorrect and misleading to say that the world price of cotton fixes the price of the American crop; it would be more nearly correct to say that the American price determines the world price. But even that statement would require qualification.

In passing, it is worth while to emphasize one distinction between wheat and cotton on the one hand and corn and hogs on the other. The world prices of wheat and cotton are predominately registered on active trading exchanges, located in various countries; the prices of

corn and hog products are not correspondingly registered. Wheat futures are extensively bought and sold in markets in the United States, Canada, Europe, and Argentina. Traders move their transactions from one market to another and from one trading month to another, and these practices tend to equalize prices (within a range) on the basis of geography and grade. Corn futures also are bought and sold in the United States, Europe, and Argentina. There is extensive trading in corn futures in this country; but it is domestic rather than international trading. The dealings in corn futures in Europe and Argentina are related almost entirely to shipments from Argentina to Europe. There is no such equalizing international trade in corn futures as occurs in wheat futures. There is also a futures market for hog products in Chicago, confined to three standardized products—prime steam lard, clear bellies, and ribs, and recently extended to live hogs. But the trading is mostly of a desultory character, not in large volume, and in particular there is little hedging by packing houses. Futures in wheat and cotton are used by manufacturers for hedging in a manner wholly different from the practice customary with corn and hog products. In the case of wheat and cotton, there is price leadership and equalization as well as price registration; in the case of corn, lard, bellies, ribs, and live hogs, there is price registration but little leadership or equalization.

Do the prices of corn and hogs behave like the prices of wheat or of cotton? Or, if not typically like one or the other, to what extent do the circumstances resemble those surrounding wheat more than those surrounding cotton or vice versa? Can it be said of the price of cash corn, in the limited sense in which it may be said of the price of cash wheat, that the world price fixes the domestic price? Or are the export prices of corn and hogs merely

opportunity prices, somewhat as seems to be the case with many exports?

FACTORS DETERMINING THE PRICE OF CORN

Despite the prominence of the corn crop, investigations into the price of corn have been few.¹ In fact, no comprehensive study conducted with the aid of recent methods of analysis seems to have been published.² The following discussion is based largely on accepted marketing experiences; but one may hazard the inference, in so far as the objectives of the present inquiry are concerned, that mathematical analysis of the price of corn would not materially alter the conclusions drawn. It is impossible to consider the various factors and circumstances involved without some overlapping and repetition. Also, the statistical data are unsatisfactory in several directions and are indeed lacking on essential points. Table 7³ contains the figures for crop, merchandisable crop, corn shipped out of the county where grown, and various other data. The year 1909 is as far back as some of the reports are available.

The price of cash corn is influenced by many factors, among which the following are more or less conspicuous. The list is disconcertingly long and the relevant data leave much to be desired.

On the supply side are:

- (1) the carryover;
- (2) the size of the crop;

¹ Probably the best study to date is that of H. A. Wallace, *The Problem of Business Forecasting*, 1924. See also H. A. Wallace and E. N. Bressman, *Corn and Corn Growing*, pp. 283-97. In his study of *Corn and Hog Correlations* (U.S. Department of Agriculture Bulletin 1300, January 1925), Sewall Wright has given some attention to corn. An important recent analysis is to be found in G. S. Shepherd, *The Secular Movement of Corn Prices* (Iowa State College Agricultural Experiment Station Research Bulletin 140), June 1931.

² For a discussion of the relations of acreage and surpluses to prices, see J. D. Black, *Agricultural Reform in the United States*, pp. 85-112.

³ See above, p. 132.

- (3) the proportion of soft corn;
- (4) the distribution of sound corn in relation to cash marketing and feeding regions, respectively;
- (5) the flow of cash corn to market—shipments, receipts, and visible supply;
- (6) the crops of coarse grains and hay.

On the demand side are:

- (1) the count of cattle;
- (2) the crop of yearling cattle;
- (3) the price of beef cattle;
- (4) the count of hogs;
- (5) the pig crop;
- (6) the price of hogs;
- (7) the price of wheat;
- (8) the prices of coarse grains, millfeed, and other concentrated feeds;
- (9) the general price level;
- (10) European imports of corn;
- (11) European prices of corn.

What is the price of corn? The answer depends on which price is meant. We have two prices of corn: the cash price of corn and what may be termed the product price or rather the products prices. To compute a value of the entire crop from the price of cash corn is inherently misleading because of the small proportion of corn sold for cash. But to compute the value of the crop from the price of one corn product (hogs) would also be misleading on several grounds.

There are three kinds of corn growers. One raises less corn than he requires to feed his animals, is seasonally a buyer, and is interested in a low cash corn price. Another raises about as much corn as he needs for his livestock, tries to adjust his livestock and his corn crop to each other, and has little interest in the price of cash corn.

The third raises more corn than is required for feeding on the farm (perhaps does not feed at all) sells annually in the cash-corn market, and is therefore interested in a high price of cash corn. In the corn belt are regions and sections displaying these varying characteristics.

The United States Department of Agriculture issues annually a figure for corn shipped out of the county where grown.¹ The Department is careful not to place much weight on these reports, and statisticians of the trade regard receipts and shipments at primary markets as probably more representative and reliable.² The merchantable corn is usually over 80 per cent of the crop and has fallen below 70 per cent only twice since 1897. But the merchantable corn in the prominent cash-corn areas is subject to heavy reduction through climatic injury. Comparing post-war with pre-war years, shipments from the farm have decreased. Illinois and South Dakota ship out of the counties where grown over 30 per cent of their corn crops, while Iowa and Nebraska ship out over 20 per cent; Illinois and Iowa together supply over 40 per cent of the total corn reported as shipped out of the counties where grown. Some regions, like central Iowa, have a fair balance of production of corn and animals, and do little selling or buying of corn. There is a considerable but scattered corn-deficiency area, interested in a low cash price of corn. The conspicuous cash-corn regions are (1) within a 150-mile radius of Chicago and (2) on both sides of the Missouri River including goodly parts of Iowa and Nebraska and also the adjacent parts of South Dakota and Minnesota.

In the five corn crop years before the war (1909-10 to 1913-14)³ the average corn crop was 2,712 million

¹ Beginning with 1928, the Class I railways report separately traffic in corn originating on their lines.

² See above, Table 7, p. 132.

³ See above, Table 7, p. 132.

bushels, of which on the average 581 million bushels were shipped out of the counties where grown. Subtracting from 581 million bushels the average exports, 40 million bushels, leaves 541 million bushels, representing corn for domestic consumption shipped out of the counties where grown, equal to nearly 20 per cent of the average crop of 2,712 million bushels. In the nine years since the war (1921-22 to 1929-30) the average corn crop was 2,793 million bushels, and the average amount shipped out of the counties where grown was 515 million bushels. Subtracting from 515 million bushels the average exports, 39 million bushels, leaves 476 million bushels for domestic consumption shipped out of the counties where grown, or about 17 per cent of the average crop of 2,793 million bushels. This suggests a diminution per annum of some 65 million bushels of corn shipped out of the counties where grown. In this decrease of shipments from farms, several factors have participated. There are fewer horses and hogs outside of farms, and there has been less brewing and distilling of corn. Other important factors have been increased country use of corn for poultry and increased feeding to cattle, hogs, and lambs in the corn states which were previously heavy shipping areas.

The cash corn price varies from region to region, being relatively lowest in surplus-producing areas distant from terminal markets, and highest in deficiency areas most distant from production. Except with short crops, the lowest cash price is usually in November-December, rising gradually until new corn appears the following autumn, when prices again decline.¹ The marketing of

¹ Using Iowa corn prices (on farms or at nearest shipping point) as illustration and employing the 5-year pre-war average, 1910-14 (a short period for a test), the price of corn was around 53 cents on November 1, declined to around 48 cents by the first of December, and remained there for almost three months, after which the price rose progressively to about 63 cents on September 1, declining again to 53 cents on November 1. (Cf. H. A. Wallace, *Agricultural Prices* [Des Moines, Wallace Publishing Company, 1920], p. 194.)

cash corn is heaviest in November-February, when as much corn is usually sent out as during the other eight months. The amount shipped out of the county where grown is much larger than the amount reported as receipts in terminal markets; much of it is locally distributed. The seasonal movement of the cash corn price varies with the carryover, the size of the crop, the proportion of soft corn, and other influences. Prices do not advance or decline uniformly throughout the country, but vary from region to region. Abundance of soft corn in the region within a hundred miles of Chicago makes for higher cash prices even if the total crop be not reduced, on account of the higher cost of shipping sound corn from a greater distance.

If one multiplies the figure for corn shipped out of the county where grown by the average producers' price for the year, one secures a rough estimate for gross farm value of cash corn marketed. Table 11 contains figures for total production, estimated value of production based on weighted average farm price, shipments out of county, and value of the latter based on weighted average farm price.

Obviously, the price of cash corn would be influenced both by the size of the crop and by the volume of corn passing into the channels of trade. If reported receipts and shipments of corn were sufficiently comprehensive and the estimate of the crop fairly accurate, it might be possible mathematically to determine the respective influences of total crop and cash-corn marketing on the cash corn price. But so far as we are aware, no such computation has been attempted.

The table reveals the small proportion of the total crop of corn marketed as cash corn, and illustrates the uncertainty involved in attempting to estimate the gross value of the whole crop by the market value of a small part. Variations in the corn crop from year to year are

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TABLE 11.—AMOUNTS AND ESTIMATED VALUES OF CORN CROP OF THE UNITED STATES AND OF CORN SHIPPED OUT OF COUNTY WHERE GROWN, 1909-10 TO 1913-14 AND 1921-22 TO 1929-30*

Crop year Nov.-Oct.	Production (million bushels)	Estimated value of production (million dollars)	Shipped out of county where grown (million bushels)	Estimated value of corn shipped out of county where grown (million dollars)
1909-10.....	2,572.3	1,625.7	620.1	391.9
1910-11.....	2,886.3	1,544.1	661.8	354.1
1911-12.....	2,531.5	1,741.7	517.8	356.2
1912-13.....	3,124.7	1,771.7	680.8	386.0
1913-14.....	2,447.0	1,756.9	422.1	303.0
Average.....	2,712.4	1,688.0	580.5	358.2
1921-22.....	3,068.6	1,666.2	587.9	319.2
1922-23.....	2,906.0	2,228.9	518.8	297.9
1923-24.....	3,053.6	2,565.0	600.7	504.6
1924-25.....	2,309.4	2,443.4	417.8	442.0
1925-26.....	2,916.1	2,070.4	578.4	410.7
1926-27.....	2,691.5	2,016.0	447.0	334.8
1927-28.....	2,763.1	2,354.2	501.7	427.5
1928-29.....	2,818.9	2,396.1	538.5	457.8
1929-30.....	2,614.1	2,086.1	442.4	353.1
Average.....	2,793.5	2,202.9	514.8	394.2

* Data from *Agriculture Yearbook, 1931*, pp. 615 and 622. The value of corn shipped out of the county where grown, not estimated as yet, will probably prove to be low for 1930-31. Cf. also Table 17, p. 257 below.

determined both by variations in yield and by variations in acreage. Before the war a fluctuation of 100 million bushels in the corn crop apparently corresponded to a fluctuation in the opposite direction of about 2-3 cents per bushel in the price of corn. Annual fluctuations in the price of corn show a fairly close negative correlation—large crops show low prices, small crops show high prices.¹ Henry A. Wallace holds that the size of the crops have more to do with cash corn prices than all other

¹ Cf. the graphs of G. M. Peterson, "The Relation of Annual Weather Surpluses to Net Farm Incomes," *The Annals*, March 1929, CXLII, 391-401.

factors.¹ The cash price is apparently determined by the crop to the extent of about 64 per cent.

According to Wright,² the acreage of corn in a given year is not appreciably increased because of scarcity and high price in the crop of the preceding year. But apparently hog production and prices in the preceding year have some influence on acreage, while the number of hogs on hand from the spring farrowing and anticipated in the fall farrowing has some direct influence on acreage of corn. All in all, however, the corn crop (not the acreage) is apparently not determined more than 10 per cent by the hog situation and 4 per cent by the previous corn price. Corn acreage is subject to influence by conditions at the time of seeding corn and by the extent of winterkilling of wheat.

In the view of the trade the factors influencing the price of cash corn are few and obvious, if one excludes the occasional variations due to difficulties in completing the contracts on the futures market. The inward carry-over, the size of the crop, the shipments from farms and receipts at terminals, the prices of other feedstuffs, and the number of animals on farms complete the list of effective factors. Divergences of the views of the trade arise in the weighting of these five factors.³

It is to be observed that no mention has been made of the possible effect of variations in demand for corn on the price of corn. Variations in demand for corn as feedstuff are, of course, included in variations in the number of animals being fed. Variations in demand for corn as foodstuff and as raw material for industry are presumably without appreciable influence. With low corn prices,

¹ H. A. Wallace and E. N. Bressman, *Corn and Corn Growing*, pp. 283-97.

² Cf. Sewall Wright, *Corn and Hog Correlations* (U.S. Department of Agriculture Bulletin 1300), January 1925, pp. 13-23.

³ For a statement on variability of corn prices see chapter xi, pp. 478-80. Appendix Table XXIII contains the monthly farm prices of corn for the five years before the war and since 1921.

consumption of corn by industries would tend to rise; with high corn prices the opposite would tend to occur; consumption as foodstuff probably would not shift to any extent. In short, variations in corn prices tend to induce variations in use as food and as industrial raw material; but there is no evidence that primary variations in demand for corn for food and industrial raw material have a noteworthy effect on corn prices.¹

In the above, no mention has been made of the possible influence of the European corn price on the American corn price. This was deferred for separate consideration and deserves a detailed examination.

INFLUENCE OF EUROPEAN PRICE ON AMERICAN PRICE OF CORN

The view has long been widely held that the American corn price was largely determined by the foreign price. Congressman (now Senator) Dickinson of Iowa, writing on "Handling Corn and Hogs under the McNary-Haugen Plan," stated that "the unit price of the whole crop is fixed by the price of the half billion bushels of cash corn."² To the extent that the cash price of corn in the United States might be fixed by the cash price in Europe, the European price would determine the American price for the crop, according to this view.

In fact, however, this extreme view seems to be no longer held. In an editorial in *Wallaces' Farmer*³ stands the statement: "We have practically ceased to be a factor in the international corn trade except in years of unusually large crops and low prices." Obviously, the

¹ For discussion of the law of demand for corn see H. L. Moore, *Economic Cycles: Their Law and Cause* (New York, Macmillan, 1914), pp. 70-72. The weakness of the coefficient of correlation of supply to price lies in the unreliability and incomparability of the farm prices of corn in the table on page 89.

² *The Country Gentleman*, July 1927, p. 12.

³ *Wallaces' Farmer*, October 7, 1927, p. 4.

domestic price could not be determined by the price in an international trade in which we have practically ceased to be a factor. In the article on "The Corn Crop" (p. 217) in the 1921 *Yearbook* of the United States Department of Agriculture it was asserted that "in the same sense that it may be said that the price of wheat is determined in Liverpool, the price of corn may be said to be determined in Chicago." Engberg also arrived at the conclusion that domestic influences determine the price of corn.¹

As a somewhat divergent view may be quoted the following British opinion:

So it comes about that although the quantity of maize actually exported by the United States is negligible compared with her total production, Chicago maize prices determine the trend of maize prices in all countries. . . . The largest exporter of maize is the Argentine, most of whose crop comes to Europe and is disposed of at prices determined by the American maize situation.²

On page 218 of the 1921 *Yearbook* of the United States Department of Agriculture is a chart of corn prices at Chicago, New York, and Liverpool from 1840 to 1921.³ Interpreting this chart in the light of international crops, imports, and exports, one is led to the view that even before the war the Chicago price (the spread narrowing) led, with Liverpool following—confirming the interpretation of the writers of the article that, in the same sense that it may be said that the price of wheat is determined in Liverpool, the price of corn may be said to have been determined in Chicago. Over the pre-war period (at least prior to 1905) it might thus have been said of corn, as of

¹ R. C. Engberg, *Industrial Prosperity and the Farmer* (New York, Macmillan, 1927), pp. 183 ff.

² Ministry of Agriculture and Fisheries, *Report on the Marketing of Pigs in England and Wales* (Economic Series, No. 12), London, 1926, p. 23.

³ This chart illustrates commercial relations only to 1914, as the war and early post-war exports were abnormal for purposes of this discussion.

cotton, that America made the world price. This interpretation of the international price of corn before the war is reinforced by a comparison of the exports of corn from the United States and Argentina during the two decades before the war. In Table 12 are given the figures for exports during the years 1895 to 1914.

During these twenty years the exports of Argentine corn, judged by 5-year averages, rose progressively as follows: 36, 60, 80, and 126 million bushels, the last figure high despite inclusion of one year of crop failure. Over the same period, the exports from the United States, judged by 5-year averages, declined progressively as follows: 140, 111, 78, and 42 million bushels. During the first 5-year period, Argentine exports were one-fourth of those of the United States; during the last 5-year period, the exports of the United States were one-third of those of Argentina. The decline of the preponderating influence of the American corn price on the world corn price may be inferred from these figures.¹

Since the war, conditions have further changed. The American price of corn no longer leads the world price of corn in the qualified sense that this was true before the war; nor yet is the American corn price directly influenced by the world price, as is true of wheat. Over several decades before the war there was a world corn price participated in by Russia and the Danubian region, Argentina,² and the United States, with American corn perhaps the most influential single factor and the Chicago price largely guiding the world price. With the decline in exports from the United States, the Danubian region, and Russia, the world corn trade now lies largely between

¹ Cf. statement of H. A. Wallace and E. N. Bressman, *Corn and Corn Growing*, p. 270: "Before the War, the surplus Danube and Argentine corn quite largely determined corn prices at Liverpool, Amsterdam and Hamburg. Dent corn from the Corn Belt of the United States occasionally had some influence in years of exceptionally large crops."

² Argentina became a large factor only after 1905.

TABLE 12.—EXPORTS OF CORN FROM THE UNITED STATES AND FROM ARGENTINA, 1895 TO 1914*

(Million bushels)

Year ^a	Exports ^b from United States	Exports from Argentina
1895.....	29	30
1896.....	101	62
1897.....	179	15
1898.....	212	28
1899.....	177	44
Average.....	140	36
1900.....	213	28
1901.....	181	44
1902.....	28	47
1903.....	77	83
1904.....	58	97
Average.....	111	60
1905.....	90	87
1906.....	120	106
1907.....	86	50
1908.....	55	67
1909.....	38	89
Average.....	78	80
1910.....	38	105
1911.....	66	5
1912.....	42	190
1913.....	51	189
1914.....	11	139
Average.....	42	126

* Data from *Agriculture Yearbook, 1931*, p. 615, and Ministerio de Agricultura de la Republica Argentina, *Estadística Agrícola, 1917-18*, p. 46.

^a Exports from the United States are for the twelve months ending in June of the years given; those for Argentina are for the calendar years.

^b Including corn meal.

Argentina and Europe, with the price determined mostly by the size of the Argentine crop and the European demand for feedstuffs. Large volumes of Argentine corn are regularly marketed in Europe; the shipments northward from the lower Danubian region have been reduced and are also erratic; Russian corn has scarcely returned

to the European market at all; the United States occasionally exports small quantities to Europe. The best statement of present circumstances would be to describe Europe as an occasional opportunity corn market for the United States, not the market through which American corn practically dominates the world price, nor yet the market from which the world price of corn is primarily reflected back to the United States. The American corn price may set the upward limit of the world corn price, but the Argentine crop sets the downward limit. And the upper limit is only occasionally in operation. The American price cannot determine the world price of corn, as in the case of cotton, since American cotton makes the world price because it is the largest supply on the international market. Nevertheless, one can picture the American corn price unilaterally fixing the world price, in some years, in the sense that the European price of corn cannot rise above the price at which American corn (priced at home on domestic factors) can be delivered in Europe.

Von N. Jasny¹ has made the following summary:

The price for which corn is delivered to the world market depends upon the relations of production in Argentina. All other countries desirous of participation in export of corn must adapt themselves to situations determined by Argentina. Argentina may find itself in the position of providing corn at relatively low prices, for example, around 35 per cent above the pre-war price or even less; several years ago Argentina exported considerable amounts at still lower prices without suffering repression in production. A factor in the international market for corn tending to raise price lies in the circumstance that the world import requirement for corn is larger than before the war because the imports of barley have declined. We must therefore count on the probability that in the coming years, in contrast with the years before the war, corn may be cheaper than barley but possibly dearer than wheat and oats. [Our translation.]

¹ Von N. Jasny, "Die neuzeitliche Umstellung der überseeischen Getreideproduktion und ihr Einfluss auf den Weltmarkt," *Vierteljahrshefte zur Konjunkturforschung*, Sonderheft 16 (Berlin, 1930), p. 76.

A more detailed comparison of wheat and corn prices is pertinent and enlightening. If one surveys the course of wheat prices over a period of years, it becomes clear that the movement and range of wheat prices in the world follow the developments in crops. The major determination of wheat price for the season occurs in the period before and after the harvest in the Northern Hemisphere. The range of prices thus equated in Europe will subsequently be modified by the crops of the Southern Hemisphere. Overseas movement is continuous, though variable; to some extent the rate of flow influences the range of prices as determined by crops in the Northern Hemisphere and modified subsequently in the Southern Hemisphere. The net requirements of importing countries, and the exportable supplies of surplus-producing countries, as they develop, and the rate of movement from the latter to the former, influence the range of wheat prices. New-crop developments also enter into the equation. The wheat prices are registered in futures trading, and the futures prices on the numerous grain exchanges in the world react upon and modify each other.

Now, in the case of corn, no such sequence of events holds. There is no such thing, in the trading sense, as a world range of corn prices based on corn requirements in importing countries and exportable supplies of corn in surplus-producing countries. No such thing occurs, in the trading sense, as world adjustment between demand and supply of corn, corresponding to the recurring adjustment in wheat that takes place yearly and engages the close attention of merchants and millers. Europe, a corn-importing continent, secures annually from Russia, the Danubian region, Argentina, and the United States certain amounts of corn, depending on European crops of barley, oats, rye, and potatoes, the available supplies of oil seeds and meal, and the range of prices of the various substitutable feedstuffs. The price level for the new corn

crop in the United States develops through May to November and is reflected in the successive corn futures of July, September, and December. The price is really not set until frost danger has passed. Subsequent price changes are secondary and seasonal; the size of the crop and the amount of sound corn (other domestic grain crops equal) practically set the price. During the period when the price of the American corn crop is mostly being determined for the season by the acreage, yield, and quality of our crop, Europe is importing little or no corn from the United States. So far as the influence of exports on domestic price is concerned, it is important to realize that usually the price for the crop of American corn is made in one part of the season, and the exports occur on the basis of that price during a later part of the season. If the Argentine corn crop is doing poorly after our crop is made, this may tend to raise the American price. Exports may occasion a readjustment of the price, but have little initial influence in making it.

The direct method of appraising American and European corn prices would be by comparing corn prices in Chicago and Liverpool. Such comparisons between the prices of wheats in exporting countries and Liverpool illustrate well the price relationship within a range. But in the case of corn, the price comparison is obviously dubious. Appendix Table X contains average quotations for No. 3 corn in Chicago, American mixed corn at Liverpool, and yellow La Plata corn at Liverpool, for the corn crop years 1921-31. There are frequently no quotations on American corn for a month at Liverpool, and the annual averages are therefore misleading. Part of the variation in margins is due to changes in freight rates.

Argentine corn usually carries a premium, often as high as 10 cents and varying from year to year.¹ There is

¹ This is due largely to smallness of kernel, superior soundness, low moisture content, and high fat and sugar content.

little active trading in corn futures by Europeans. For the most part, no positive inferences can be drawn from the table. The most reasonable interpretation, in the light of concurrent domestic circumstances, is to regard the Liverpool prices from the American export parity. Whenever the American price, domestically determined, is low enough to permit of export as a profitable transaction for merchants, American corn appears on the Liverpool market. When there is close adjustment between available Argentine corn and European demand, the Liverpool price may rise high enough to place American corn (whatever the crop) on the export basis. Conversely, when the American crop is heavy, the domestic price may fall so low as to place American corn on the export basis. So large a proportion of the Argentine crop must go abroad that the corn grower in Argentina is in the same position as the wheat grower in Canada. The figures clearly do not support the view that the American price of corn, of which we have always an exportable surplus, is regularly and directly influenced to a significant extent by the corn prices in Liverpool.

It is informative in this connection to consider together the monthly cash corn prices in the United States and monthly importations of corn into Europe. It will suffice to use the monthly weighted price of No. 3 yellow corn in Chicago and monthly imports of American and Argentine corn into the United Kingdom. The American crop is made between May and October, the Argentine crop between September and March. Other things being equal, the price level of our corn year, November–October, is established during September–December. Exports of American corn are heaviest in January–April; Argentine exports are heaviest in May–September; American exports after December work against the pressure of seasonal rising prices in the United States and in the face of the development of the Argentine price. When exports

from Argentina begin in the spring, the American price tends to be substantially higher than it was in the preceding December, while the Argentine price is usually at the lowest point of their crop year. In Appendix Table X are included, in addition to Chicago and Liverpool prices, United States exports of corn overseas and the importations into the United Kingdom from the United States and Argentina.¹

From this table we gather that these grains can scarcely be termed competitive in that market, on the level of imports of American and Argentine corn into the United Kingdom during the last eight years, except in the sense and to the extent that Europeans are in position in December to choose between imports of American corn during January–April and later imports of Argentine corn during May–September. If European crops of feed grains are plentiful and supplies of corn for immediate needs are available from the Danubian region or from Russia, it may prove practicable to greater or less extent for Europeans to defer importations until spring, in the hope that the later price of Argentine corn will be below the earlier price of American corn. On the other hand, if European supplies of feed grains are low in the autumn, this would favor importation of corn from the United States. Except for old Argentine corn, there is least competition between Argentine and American corn in Europe during December–March; and, except for unusually dry or especially prepared American corn, there is little direct

¹ Fall-shelled corn is prone to spoil; to be exported safely, corn must be dried on the cob in bins, or artificially. No. 2 corn (15.5 moisture) is safe, No. 3 corn (17.5 moisture) unsafe, and No. 4 corn (19.5 moisture) is safe only on cob in bin. To be exported in the spring the moisture ought to be below 14 per cent. Unless corn is especially selected and dried for export, American corn must be shipped between December and May. Later, when it is hazardous to export American corn, Argentine corn may be exported without risk. The flint corn of the Argentine is naturally drier than the dent corn of North America, requires less selection, and can usually be sent elevator-run into export, in a riskless manner not usually possible with North American corn.

competition between American corn and Argentine corn in Europe during April-July. The monthly course of Argentine shipments is in many years well maintained. The contrast between the volumes of European imports of corn from the United States and from Argentina serves further to reinforce the inference drawn from the table. It seems clear that the equation between Argentine supply and European demand is fundamental to the corn price in Argentina; it seems equally clear that the equation between American supply and European demand is not fundamental, but only incidentally subsidiary, to the corn price at Chicago. It would seem to require no mathematical interpretation of such figures to indicate that the price of corn in Chicago has not been significantly affected by the price of corn in Europe during recent years.

SUMMARY

Among the factors influencing the price of cash corn, the European price of corn is nowadays clearly one of the least important—a minor factor in any year, and in most years without sensible influence. The price of cash corn is set by domestic factors, of which the crop is the chief influence. With our price of cash corn set by domestic factors, Europe may import some, if the price suits; if the price seems low, Europe may import a considerable amount, and this would tend to elevate the American price. But if the price seems high, Europe takes little or none, which need not tend to depress the domestic price. We do not have a low price because we export and thus receive the reflex of the world price; we export, if at all, because we have a low domestic price. If we had a bumper crop of corn and a low count of cattle, hogs, and sheep, then for a time of heavy export our price might again determine the world price. But under no circumstance illustrated since the war is the influence

of the European price determinative. As for the going price of corn in this country, the influence of the corn price of Europe is absent most of the time, inconsequential or nominal most of the rest of the time, and only relevant under peculiar and unusual circumstances. The true relation is one of opportunism; when the domestic price of corn for domestic reasons happens to be low enough to enable us to sell parcels abroad, we export. To tie up the cash price of corn in the United States with the cash price of corn in Europe in a definite price relationship is without warrant.

THE PRICE OF HOGS

The price of hogs has received more attention than the price of corn. This is to have been expected, since hogs represent the largest single outlet for corn. Also, on account of the nature of the two products, it has been thought possible to forecast the price of hogs in a manner not possible for corn, and this has naturally stimulated investigations of hog prices. Modern treatment of hog prices dates back to the publication of *Agricultural Prices*,¹ by H. A. Wallace in 1920, although G. F. Warren, in his book on *Farm Management* issued in 1913, made some contribution to our knowledge of the hog cycle, which had become well known in the markets following its recognition by Benner in 1876. The recent investigations have represented attempts to apply mathematical treatment, especially correlation, to hog prices and to several variables entering into them. While not complete in any direction, these publications constitute highly valuable additions to our knowledge, both in the direction of interpretation and forecast. They expand and supplement the interpretation of hog prices made along conventional

¹ A chart on the early relationship of corn crop and prices to hog prices is to be found in the minority report on proposed legislation on lard adulteration (51st Congress, 1st Session, *H.R. Report 970*, Serial 2809, p. 1).

lines of market analysis, and on a number of points have provided new knowledge and new methods of approach. The investigations of Warren,¹ Wallace,² Warren and Pearson,³ Wentworth and Ellinger,⁴ Sarle,⁵ Wright,⁶ Haas and Ezekiel,⁷ Bjorka,⁸ and Hanau⁹ have not merely clarified the questions of past, present, and future hog prices; they furnish indications that strict methods of economic analysis are finding application in animal husbandry. For the most part, the available investigations have been confined to pre-war prices, and there is some question of the extent to which present conditions correspond to pre-war conditions. Gradually, however, the hog production of the world is conforming to the pre-war behavior, and, provisionally, it may be assumed that conditions during recent years may reasonably be interpreted, with qualifications, in accordance with knowledge of conditions during the two decades before the war. Also, it seems probable that it will be safe to judge the immediate future in the same manner.¹⁰

¹ G. F. Warren, *Prices of Farm Products in the United States* (U.S. Department of Agriculture Bulletin 999), August 1921.

² H. A. Wallace, *Agricultural Prices* (Des Moines, 1920).

³ G. F. Warren and F. A. Pearson, *The Agricultural Situation, Economic Effects of Fluctuating Prices* (New York, 1924); also *Interrelationships of Supply and Price* (Cornell University Agricultural Experiment Station Bulletin 466), March 1928.

⁴ E. N. Wentworth and T. U. Ellinger, "The Determination of Hog Prices at Public Markets," *Journal of Farm Economics*, July 1924, VI, 279-82.

⁵ C. F. Sarle, "Forecasting the Price of Hogs," *American Economic Review*, Vol. XV, No. 3, Supplement No. 2, 1925.

⁶ Sewall Wright, *Corn and Hog Correlations* (U.S. Department of Agriculture Bulletin 1300), January 1925.

⁷ G. C. Haas and Mordecai Ezekiel, *Factors Affecting the Price of Hogs* (U.S. Department of Agriculture Bulletin 1440), November 1928.

⁸ Knute Bjorka, *Some Statistical Characterizations of the Hog Market* (Iowa State College Agricultural Experiment Station Research Bulletin 102), May 1927; also, *International Trade in Pork and Pork Products* (Iowa State College Agricultural Experiment Station Research Bulletin 122), February 1930.

⁹ Arthur Hanau, "Die Prognose der Schweinepreise," *Vierteljahrshefte zur Kunjunkturforschung*, Sonderheft 2 (Berlin, 1927), Sonderheft 7 (1928), and Sonderheft 18 (1930).

¹⁰ For a general appraisal of the relations of volume to value in the case of hogs, see J. D. Black's *Agricultural Reform in the United States*, pp. 116-25.

The price of hogs in the principal terminal markets is the resultant of a large number of possible factors.

On the supply side are :

- (1) The number of hogs;
- (2) reports on intentions to breed;
- (3) the conditions for farrowing;
- (4) the pig crop;
- (5) the proportion of the pig crop passing to market;
- (6) the proportion of the breeding crop passing to market;
- (7) the course and volume of market receipts;
- (8) the trend of weights of marketed animals;
- (9) volume of pork products in storage;
- (10) the European crop of hogs.

On the demand side are :

- (1) the growth of population;
- (2) the state of business, prosperity, and employment;
- (3) the general price level;
- (4) the crops and prices of corn, barley, and oats;
- (5) the prices of beef and lamb;
- (6) the prices of butter and butter substitutes;
- (7) the prices of vegetable oils and lard substitutes;
- (8) the foreign demand.

This is a disconcertingly long list of factors (not all to be discussed), but all of them have, or in some seasons may have, some influence. Hog raisers and finishers, cattle raisers and finishers, and corn raisers, all modify their practices to take commercial advantage of existing

and prospective price relations. A short corn crop, with a large pig crop, tends to liquidative marketing of hogs; a large corn crop, with a short pig crop, may result in high prices even for animals of lower classes and heavier weights. Coincidence of a large corn crop with a large pig crop tends to heavy marketing of all classes and weights, with price declines. A short corn crop with a short pig crop tends to high prices of all classes. Of the stated factors on the supply side, the size of the pig crop and the acreage of corn are under direct control of growers, but the crop of corn is subject to climatic influences.¹ The number and weight of hogs delivered to American markets seem the major factors in determining the domestic price; the other factors are secondary, but on occasions one or another of these factors may be of exceptional influence. Price level and price fluctuations are almost equally important in farmers' plans.

Fluctuations in hog prices represent to producers the most inexplicable events in their business. Unfortunately, mathematical analysis of price fluctuations has not been carried out on a scale sufficient to clarify the question.² There are four types of price fluctuations involved—secular, cyclic, seasonal, and short-term.

THE SECULAR TREND OF HOG PRICES

The secular trend of hog prices was downward from the early 'seventies until the middle of the 'nineties, at an average rate of about 3.5 cents per hundredweight per year. Turning abruptly around 1896, the secular trend of hog prices was upward until the outbreak of the war, at

¹ Cf. R. C. Engberg, *Industrial Prosperity and the Farmer*, p. 260.

² With respect to variability of prices in general, little is known that could be used as background for the study of price variations in a particular commodity. Indeed, the statistical approach is not yet satisfactorily established. Mills has issued an informative volume on *The Behavior of Prices*, according to which the general tendency before the war was in the direction of declining variability, while since the war apparently a tendency toward increased variability has been again manifested. In the table below, rearranged from Mills,

the average rate of about 25 cents per hundredweight per year. The difference between the rate of trend downward and upward is striking. The secular trend of price downward seems to have been due to several factors, of which the rising value of money was one. The secular trend of price upward is usually regarded as having been due largely to the falling value of money. When the farm value of hogs is adjusted to the price level, the trend is seen to have been upward from 1866 to 1914. Since the war, no secular trend of hog prices is in evidence.¹

CYCLES OF HOG PRICES

The cycles of hog prices are well illustrated in Chart 9 reproduced from Bjorka,² based on monthly prices of

the relatively high susceptibility of farm products and foodstuffs to variability of prices is clearly indicated.

MEASURES OF MONTHLY VARIABILITY OF COMMODITY PRICES AT WHOLESALE, BY GROUPS, FOR 1890-1925, EXCLUDING 1914-21*

Groups	Number of commodities	Measures of variability		
		Low	High	Median
Farm products	24	3.7	28.4	8.4
Foods	39	0.8	11.4	6.3
Metals and metal products...	34	0.0	8.1	3.9
Fuel and lighting.....	12	0.7	13.9	3.7
Chemicals and drugs.....	11	0.9	7.8	3.5
Building materials	21	1.5	8.9	3.4
Cloths and clothing.....	37	0.1	5.7	2.7
House furnishings	15	0.5	4.3	1.1

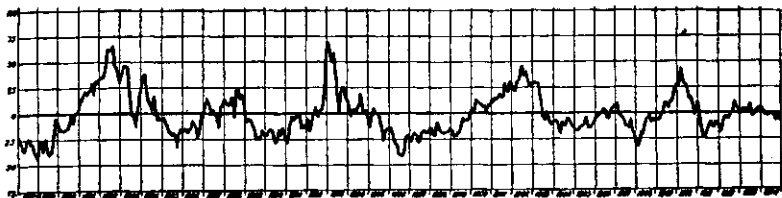
* Based on Table IV, pp. 489-93, of F. C. Mills, *The Behavior of Prices* (New York, 1927).

¹ The question of the effect of the value of gold on the value of hogs before the war is of importance in appraising the trend of exports of hog products; but having no direct application to the problem since the war, this need not detain us here. See Fig. 7 in G. S. Shepherd, *The Secular Movement of Corn Prices*, p. 196. A declining secular trend in hog prices is anticipated by some observers.

² Knute Bjorka, *Some Statistical Characterizations of the Hog Market* (Iowa State College Agricultural Experiment Station Research Bulletin 102), May 1927, p. 6.

CHART 9.—CYCLES OF HOG PRICES—MONTHLY PRICES AT CHICAGO, WITH SECULAR TREND AND SEASONAL CHARACTERISTICS REMOVED, 1878-1914*

(Percentage)



* Reproduced from Knute Bjorka, *Some Statistical Characterizations of the Hog Market* (Iowa State College Agricultural Experiment Station Research Bulletin No. 102), May 1927, p. 6. "The cycles show variations above and below the normal seasonal changes in terms of percentages of the seasonal norm."

hogs at Chicago with secular trend and seasonal characteristics removed, covering the period from 1878 to 1914. The cycle of hog prices represents the counterpart of the cycle of receipts and expresses roughly the inverse relation of price to supply. Hog cycles are due largely to overbreeding and underbreeding; when husbandmen expand or contract breeding, the effect will appear on the hog market within a year, and the result will be in evidence for probably another full year. This is due to the brevity of the period of gestation in hogs and the time required to bring the gilts and barrows to market. The duration of the cycle of hog prices is commonly given as around four years, i.e., four years from peak to peak and from trough to trough, or two years from peak to trough and two years from trough to peak. In the cycles since 1878 to 1914 as plotted by Bjorka, however, no such regularity is to be observed. Seven cycles are found during this period of thirty-six years; discarding one extreme figure (seventy months), the smallest number of months from trough to peak was twenty-three and the largest forty-five; the smallest number of months from peak to

trough was twelve and the largest forty-three. The average of the number of months from trough to peak, thirty-one (again excluding the high figure of seventy months), and from peak to trough, twenty-seven, mean little on account of the low number of observations and the wide variations between them. Apparently, there are what may be termed major and minor cycles.

With some qualification for weights and grades and other factors influencing hog prices, the cycles of hog prices may be defined as the eventual price results of breeding operations based on the corn-hog ratio. Naturally, the cycle of hog prices is more strikingly observed in the corn-hog belt than in the deficiency states.

SEASONAL MOVEMENT OF HOG PRICES

The seasonal fluctuations of hog prices are related mostly to variations in receipts in terminal markets. The time of harvest of the corn crop, the troubles and hazards of farrowing in midwinter, the average age at which hogs are marketed, and the disposition of work on farms combine to determine breeding operations in the corn belt so as to make the months November–February the period of heavy marketing of hogs.¹ The highest hog price of the season tends to be during August–September, followed by decline to the lowest price of the season in December; then a rise in the spring followed by a slight decline in May–June and a rise into August. Notable variations exist from year to year in height of peak and depth of trough and in their earlier or later occurrence. That the seasonal movement of hog prices is related to the seasonal variation in receipts at terminal markets is illustrated in Table 13 taken from Bjorka's study, in which receipts and prices have been converted into indexes.

¹ Weather conditions during farrowing time have a substantial influence on the pig crop, and apparently some of the variation in the supply of hogs may thus be ascribed to climatic factors.

TABLE 13.—INDEX NUMBERS OF SEASONAL HOG RECEIPTS AND HOG PRICES AT CHICAGO, AVERAGE FOR 1897-1914*

Month	Receipts	Prices
January	126	95
February	112	99
March	97	104
April	84	105
May	98	102
June	100	100
July	87	102
August	86	102
September	80	102
October	95	98
November	111	92
December	126	91

* Data from Knute Bjorka, *Some Statistical Characterizations of the Hog Market* (Iowa State College Agricultural Experiment Station Research Bulletin 102), May 1927, p. 8.

SHORT-TERM FLUCTUATIONS OF HOG PRICES

Within the seasonal movement occur short-term fluctuations, from month to month, from week to week, and from day to day. Broadly considered, these price fluctuations correspond with fluctuations in receipts at terminal markets, due to a considerable extent to inexpedient marketing. It is the day-to-day and week-to-week price fluctuations that impress producers, and these tend to have an undue importance attached to them.¹

MARKET GRADES OF HOGS

In order to appreciate the range of hog prices, it is necessary to consider hogs by grades and qualities. It is only recently that the United States Department of Agriculture has set up grades for live hogs.² While a large

¹ Appendix Table XXIV contains the monthly farm prices of hogs for five years before the war and since 1921.

² Trading in futures contracts for live hogs has been established on the Chicago Livestock Exchange. It represents a striking innovation to deal in

proportion of hogs are sold on the farm for local consumption and to buyers for packers, the wholesale prices of hogs are registered in the public stockyards at terminal markets, with local and direct sales supposedly conforming to terminal prices.

In terminal markets hogs are now divided into four classes: butcher, packer, feeder and stocker, and bacon hogs. Bacon hogs are mostly Tamworths and Hampshires, with other breeds that approximate the conformations. Butcher hogs are the average run of gilts and barrows,

futures of a highly perishable commodity which cannot be stored. We are not here concerned with the advantages of such trading to merchants and packers. In theory, it would provide price insurance for producers. Just as the wheat grower in Kansas, when his crop looks fairly safe in March, could sell a futures contract in the September market, and deliver his crop against his contract, so the farmer in Iowa, fairly certain of his corn crop and pig crop in September, could then sell live hog futures and deliver his animals against his contract. It would constitute a particularly advantageous form of hedging for feeders who purchase both corn and pigs for finishing. Striking differences between trading in futures in grain and in hogs must, however, be recognized.

In the case of grain, delivery occurs in the form of a warehouse receipt, with which a stockyard receipt for live hogs is not comparable. Grain is stored in elevators in terminal cities, available for delivery if demanded on warehouse receipts; live hogs cannot be stored, preparatory to delivery on contract. Grain can be rushed to market to prevent a corner; live hogs cannot be correspondingly assembled and rushed to market. Finally, hogs have not been graded and standardized as well as grain, and probably cannot be as well graded and standardized. Above and below the basic grade of grain deliverable directly on contract, stand several grades deliverable under specified stipulations at stated discounts and premiums. It is difficult to picture a comparable state of affairs with live hogs. At the beginning of the crop year the miller analyzes the wheats of each region for protein content, flour yield, and baking qualities; the hog crop of a year cannot be similarly analyzed. Whether the lean parts of a hog are well developed according to trade standards, whether the fat is firm or soft, whether the carcass dresses out well or poorly, are not yet matters of measure or forecastable analysis. The carcass-cutting tests that are carried out at livestock shows illustrate clearly how much of the judgment on packing-house yields of live hogs, both quantities and qualities, is a matter of art and experience, rather than definition. The introduction of trading in hog futures will unquestionably lead to the formulation of better standards and grades than we now possess. But it seems doubtful whether such trading is to provide, for some time at least, either large opportunities for speculators or substantial insurance for producers. Most large packers do not hedge hog receipts by selling futures of lard, ribs, and bellies, but some small packers do. The large packers cannot hedge because the volume of transactions in futures of hog products is not large enough to carry heavy hedging contracts. Packing remains, therefore, a speculative business.

usually less than ten months old (the best under eight), but including some better-grade sows. Packer hogs consist largely of older breeding stock. Feeders and stockers are animals passing through the stockyards in transit to feeding yards, whence they will be later returned as bacon, butcher, or packer hogs. There is also a special class of young pigs, corresponding with porkers. The relative numbers of these classes vary from region to region, from one part of the season to the other, and from year to year.

Butcher and bacon hogs are divided into four weights—heavy, medium, light, and light light. Light light-weights are under 160 pounds; light-weights run from 160 to 200 pounds; medium-weights, up to 250 pounds; and heavy-weights from 250 to 350 pounds. Packers, feeders, and stockers are divided into three classes—light, medium, and heavy. Underweights and overweightes are allowed for in all classes. Although the authorities try to keep the weights constant in all the principal markets, the natural tendency is to shift them in one direction or the other, season after season, in different markets. In each group there are from three to five grades of qualities—common, medium, good, choice, and prime, the terms varying somewhat from market to market. Packer sows are generally graded as smooth or rough.¹

These various classes, weights, and qualities overlap and shade into each other, and the particular discernment of the buyers of the packing houses lies in their

¹ A new set of tentative standards has been worked out by the United States Department of Agriculture, the National Swine Growers' Association, and the Institute of American Meat Packers. Hogs marketed for slaughter are divided into five groups: barrows and gilts, sows, stags, boars, and pigs. Four grades are provided for barrows and gilts: choice, good, medium, and culls. The choice barrows and gilts are further divided into meat type and fat type, representing a broad recognition of segregation into bacon type and lard type. Weight divisions are provided for barrows and gilts, beginning at 120 pounds and extending in 20-pound intervals to 240 pounds; from 240 to 360 pounds the intervals are extended to 30 pounds. These tentative classifications represent a considered attempt to grade hogs on the basis of outturn of edible products.

ability to look under the skin and evaluate the eventual worth of the animals in terms of packing-house products.¹ The weights tend to shift upward and downward with conditions in the corn market; with a plentiful supply of corn the hog weights tend to rise, and to decline with a scarcity of corn. When feed, especially corn, is expensive, gilts and barrows are sent to market early and fed lightly and therefore carry low weights, while breeding stock is marketed without being well finished. When feed, especially corn, is cheap, gilts and barrows are fed profusely and often held back a little, and therefore carry heavy weight, while breeding stock is fed to still heavier weight. Despite the premium usually accorded light-weight hogs on the basis of differential value of the different products, heavy hogs may command a premium on the market whenever light-weight hogs are marketed in excessive numbers. Usually bacon hogs command a premium over all others; and light- and medium-weight butcher hogs bring a premium over heavy-weights. Packer hogs grade varying lower than butcher hogs.

RELATION OF PRICES AND RECEIPTS

The range of prices at any time is relatively wide and the spread between the top of choice bacon and butcher hogs and common packer hogs is usually several dollars. Within the range, the different classes and grades may shift their relative positions considerably.

Hogs are marketed in public stockyards in the nine principal markets and in numerous smaller markets. Private stockyards controlled by packing houses are located at strategic points in the corn belt. Drovers and

¹ It is little less than astonishing how difficult it is to judge from the external appearance of live hogs the outturn of the different cuts and products as to quantity and quality. When, in addition, the packing house is faced with price fluctuations for the different parts, a forecast of the "cut-out values" becomes a rare art. Of this a good illustration is afforded in the reports of cut-out values that currently appear in the *National Provisioner*.

commission merchants buy hogs in the country and ship them directly to packers as well as to public stockyards. Co-operative associations ship to packers directly as well as to public stockyards. Apparently, at least half of the hogs of the corn belt sent to terminals are shipped by producers or producers' co-operative associations.¹ In the corn belt the volume of direct marketing of hogs since the war has been relatively constant at something like one-fourth of the total marketing. Packing houses buy directly in the country to an increasing extent. In the public stockyards, hogs are sold by commission houses, co-operative associations, and private owners, and they are also resold by packers. Receipts include hogs for slaughter and for feeding, often involving reshipment.

Receipts in most terminal markets are lightest on Saturday and heaviest on Monday, though in a few markets, like Omaha, midweek receipts may be heavier than those on Monday. In the public stockyards it is customary to dispose of all animals on Saturday night; but from Monday to Saturday varying numbers of hogs are left unsold in the yards over night. Thus, daily slaughtering does not correspond to daily receipts.

The hog market is characterized by widely varying receipts, and in particular the heavy receipts are apt to come in runs, of which both the volume and the duration may influence prices. The run of market receipts, the prospective marketings, the amount already slaughtered during the season, and the volume of stocks in storage are regarded by packers as the important considerations influencing the buying policy at any particular time. Cold storage of pork products has had the effect of reducing the price fluctuations dependent on variations in supplies; but variations in amounts of pork in cold storage in themselves exert influence on prices.

¹ Cf. *Agriculture Yearbook*, 1926, pp. 234-37.

Rising prices with light receipts and falling prices with heavy receipts, together with varying premiums and discounts on light and heavy hogs, are frequent occurrences in the public stockyards. The duration of the deviation is of importance.¹ Producers and shippers try to "outguess the market" and have their consignments arrive on days of hoped-for light receipts. Packers, though commonly prepared to take all hogs offered at a price, try to forecast the rate of marketing. With their central locations, the advantage seems to rest with the packers, and this is accentuated by the advantages of private stockyards and of direct country buying. In all the central stockyards an excessive number of commission houses operate, and the army of salesmen constitutes an excessive overhead.

It seems to be the general impression in farm circles that light receipts are not as effective in raising prices as are heavy receipts in lowering prices. But the basic trouble is usually too many hogs of certain kinds. It is in connection with the marketing of an excessive number of one kind that the course of marketing tends especially to influence prices. Doubtless a better average price could be secured if the hog crop could be marketed over the year in a seasonal curve adapted to consumption, exports, and storage; but this would not conform to the advantageous course of farrowing or to the lowest cost of production. Nor is it clear that it would make much difference under circumstances of overproduction. There seems to be no direct relationship between daily receipts and daily prices; but there is some relationship between the variations of receipts and of prices from their usual

¹ Cf. the statement of Haas and Ezekiel, supported by a computed correlation: "During the period before the war a reduction of 10 per cent in the number of hogs marketed over a six-months period, as compared with the number marketed in other similar periods, had a tendency to raise prices, on the average, about 5 per cent; whereas an equal reduction in the number of hogs marketed during a single month, as compared with other months, tended to raise prices to a much less extent."—*Factors Affecting the Price of Hogs* (U.S. Department of Agriculture Bulletin 1440), November 1926, p. 12.

daily percentages. This influence holds more for weeks than for days, and is due to the fact that packing houses try to adjust current purchases to correspond with expected receipts. Holdover hogs may exaggerate, or moderate, the effect of receipts out of line with usual percentages during the week.

In recent years a new question has arisen—the issue of the private stockyard. Country buying by packers is on the increase, the prices being based on quotations at public stockyards. The packers are also establishing private stockyards, of which the Mistletoe Yard at Kansas City has been the most conspicuous example. Sales of hogs occurring in private stockyards do not register in published prices. With the growth of private stockyards and with the expansion of country buying by packers and of direct sales by producers' associations to packers in terminal markets, the proportion of hogs sold in public stockyards tends to decline. The smaller the number of hogs sold in public stockyards, the less representative become the published price quotations of stockyard sales. The fear is felt in the corn belt that the relative decline of open stockyard sales may have the effect of so limiting the public registration of hog prices as to obscure the equation between supply and demand. If hog prices at public stockyards become less representative, then farm prices lose their base-line. In conformity with this view, efforts have been and are being made to induce Congress to enact legislation limiting private stockyards, in the belief that open registration of prices in public stockyards is in the interest of producers, despite the price fluctuations induced by varying receipts attending heavy marketing at public stockyards.

Traders, as well as farmers, incline to the view that the rate of marketing hogs, as well as the number and weight of hogs, influences the price of live hogs. According to the common theoretical treatment of price, the total

supply is offered for sale, and is sold, and all buyers participate in the bidding; under these circumstances, the price of the entire supply is determined by the price for which the last lot is sold. But in the livestock markets the predicated conditions never hold. The supply is not all offered for sale, nor is it all sold; in any event, the total supply is not measurable until after the season is over.¹ Furthermore, we deal not merely with physical supply and physical demand, general price level regarded as constant; it is also opinion on available supply and opinion on prospective demand that influences sellers and buyers. Under these circumstances, it is perhaps fairly assumed that the course of marketing through the season has some influence on the price, upward or downward. In the nature of our open marketing methods, variations in rate of marketing and fluctuations in prices are spectacular, and the public has an exaggerated idea of the influence of fluctuations on prices. Some influence doubtless exists; but in general the consensus of commentators is that hog prices reflect the general trend of the supply over the period rather than the supply of individual weeks. The outstanding difficulty lies in trying to apply any criterion of marketing trend to the entire supply.

HOG PRICES AND SLAUGHTER UNDER FEDERAL INSPECTION

In the same sense as the price of cash corn is influenced by the size of the crop, the volume of corn passing into the channels of trade, and the visible supply, so the price of hogs in terminal markets ought to be influenced by the total number of hogs, the estimated total slaughter, and the number slaughtered under federal inspection. The number slaughtered under federal inspection is de-

¹It must be kept in mind that half the hogs sold are disposed of locally by farmers. Probably low prices stimulate slaughter outside of federal inspection.

terminable month by month, with the beginning of the hog year on November 1. The estimate of total swine in the country, as of January 1, is available in February; the estimate of hogs slaughtered outside of federal inspection is not arrived at until the end of the hog year. Therefore, receipts and slaughter under federal inspection are the first known facts of supply in point of time; probably also they are the most important factors in influence on price. The report on intentions to breed, once the survey becomes established, since it appears fairly early, ought to be as significant of the total prospective supply as the estimated number of swine in the country on January 1.

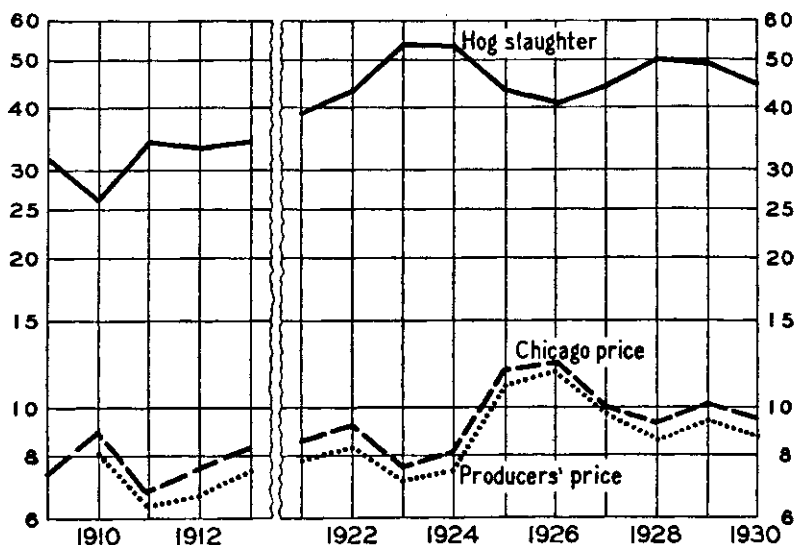
In Chart 10 the influence of volume of slaughter under federal inspection on terminal and farm prices of hogs during the post-war period is clearly indicated. But it is also clear that other influences are at work. In three of the years (1922, 1925, and 1927) the volumes of slaughter under federal inspection were almost identical, but the prices, although fairly close in 1925 and 1927, were appreciably lower in 1922. The year of lowest slaughter, 1921, was a year of low price, which might be explained by the general deflation in price under way during that year. Otherwise, the years of heaviest slaughter (1923 and 1924) were the years of lowest prices, and the year of second lightest slaughter, 1926, showed the highest price.

The hog price of the year is too coarse for interpretation. It must be separated at least into prices for summer slaughter and for winter slaughter, since these represent different breeding operations and different packs. The subject has been examined by different investigators, especially Wright.¹ But the application to the inquiry here in hand is not discernible. Wright suggests that the price of corn plays as great a part in determining the bids made by the packers for hogs as does the supply of hogs.

¹ Sewall Wright, *Corn and Hog Correlations*.

CHART 10.—NUMBER OF HOGS SLAUGHTERED ANNUALLY UNDER FEDERAL INSPECTION, ANNUAL WEIGHTED AVERAGE PRICES OF HOGS AT CHICAGO, AND HOG PRICES RECEIVED BY PRODUCERS, 1909-13 AND 1921-30*

(Million hogs; dollars per 100 pounds; logarithmic vertical scale)



* Based on data in *Agriculture Yearbook, 1928*, p. 930, and *1931*, p. 851, supplemented by data obtained from the Bureau of Agricultural Economics of the U.S. Department of Agriculture.

INFLUENCE OF FUTURES PRICES ON CASH PRICES

In the case of grains, the relations between cash prices and futures prices, the influence of cash prices on futures and vice versa, and the question of leadership are large and important problems. In the case of hog products no such situation obtains between spot prices and futures prices. On the provisions market contracts for future delivery are sold for prime steam lard, short ribs, and dry salt bellies, which are probably almost as closely standardized as the grains are graded. The volume of trad-

ing in such futures is small; there is some speculation in lard when live-hog prices are moving up or down, but it is not of consequence in the total operations of packing houses. Country hog buyers, commission merchants, packing houses, and exporters do not hedge on the provisions market as country grain buyers, terminal grain merchants, flour millers, and exporters hedge on the grain exchanges. In short, futures trading in hog products is not much employed as hedging for purposes of insurance, in striking contrast with the grains, where hedging is widely employed for purposes of insurance.

Under these circumstances, the futures prices of hog products can hardly be reflected back to the farm. The futures price of lard, obtained to the extent of 35 pounds per average slaughtered animal, could hardly react sensibly on the cash price of live hogs weighing all the way from 150 to 450 pounds. The futures prices of short ribs and dry salt bellies could hardly be reflected back to the prices of live hogs, of which the majority will furnish no short ribs or dry salt bellies. The futures prices of lard, of short ribs, and of dry bellies that are mostly fat could hardly be reflected back to the prices of green or cured hams or shoulders which are largely lean, nor to the live animals which furnish these hams and shoulders. The futures prices of ribs and dry salt bellies proceeding largely from packer sows could hardly be expected to react on the prices of green bellies or cured bacon of high-grade butcher hogs or of the live animals that produce them. At the most, the futures could be expected to be related to prices of packer hogs. In packing-house accounting practice, the slaughter department sells the various cuts and materials at current prices to the manufacturing department. So, also, in flour-mill accounting practice the grain department sells wheat to the manufacturing department. But in the case of flour milling, the simplicity of the joint-product operation permits

wheat futures prices to be reflected back directly to the wheat prices and flour prices of the mill, whereas in pork packing the complexity of the joint-product operations is such that the futures prices of three of the subordinate products—lard, short ribs, and salt bellies—cannot be correspondingly reflected back to the other hog products and to live hogs.¹

HOG PRICES IN GERMANY

In 1927, 1928, and 1930 Hanau issued studies of hog prices in Germany, employing modern mathematical treatment.² The price of hogs was found to be determined largely by market supplies and the price of feedstuffs. A feed-unit price was set up, corresponding to 60 per cent of grain and 40 per cent of potatoes, representing customary practice in Germany. With the use of the data on hog receipts, the feed-unit price, and changes in the number of sows on farms, it was found that price movements in live hogs could be forecast for twelve to eighteen months with a surprising degree of approximation. Apparently, about eighteen months after the occurrence of what landlords and peasants regards as a favorable feed-unit price, large numbers of hogs will appear on the market. German hog prices rest broadly on factors of supply, variations in supply overshadowing variations in demand in their effect on prices. Hanau further advanced the view that German hog prices were determined almost entirely by domestic supplies, from which it follows that the imports of American lard do not react significantly upon live hog prices in Germany. At the same time, since price movements in Berlin have tended to

¹ Cf. G. C. Haas and Mordecai Ezekiel, *Factors Affecting the Price of Hogs*, p. 52.

² Arthur Hanau, "Die Prognose der Schweinepreise," *Vierteljahrshefte zur Konjunkturforschung*, Sonderheft 2 (Berlin, 1927), Sonderheft 7 (1928), and Sonderheft 18 (1930).

parallel those in Chicago, it remains possible that heavy production or light production occurs simultaneously in Germany and the United States in response to favorable or unfavorable prices of feedstuffs equated on the international market.

INFLUENCE OF PRICE ON CONSUMPTION

Demand for foodstuffs varies less than supply because there is nothing in consumption habits that corresponds to fluctuations in crops. It needs no statistical elaboration to indicate that consumption of hog products in the United States is relatively constant contrasted with hog production, which rises and falls in cycles. Nevertheless, contrasted with other staples, the consumption of hog products is somewhat elastic. The state of prosperity, the growth of population, the all-commodity price level, the prices of other animal products and of substitutes tend to influence consumption.

Meat consumption is regarded, among the foodstuffs, as relatively elastic. An important factor is the price of substitutes. Hog products compete with beef, mutton and lamb, poultry, fish, eggs, cheese, butter, oleomargarine, and the several vegetable oils. This is active competition from the standpoint of salesmanship, and the prices of these substitutes probably have as much influence as general prosperity upon the consumption of hog products. But so long as prosperity persists, the demand for hog products is stable enough to be regarded as relatively constant, with seasonal adaptations, compared with production.

A distinct trend has become manifest in the direction of consumption of fresh pork, due apparently to increase in urban population. Fresh pork competes with fresh beef, lamb, and poultry (as well as with cured pork), and the demand is modified by culinary preferences as well as by the prices of the competing fresh meats. The auto-

mobile has increased the demand for sausage. The demand for salted products, either wet or dry (backs, sides, ribs, and bellies), is relatively on the decline, because of the public's aversion to fat and the decline of exposed and heavily laborious occupations. Lard is continuously on the defensive against vegetable oils, and the price of lard depends to a substantial extent on the price of cottonseed oil. These consumer reactions are reflected back to wholesale prices.

A comparison of the relations of bread and pork products is instructive in this connection. Bread is a low-priced foodstuff; our consumption of bread is relatively small. Meats are relatively high-priced foodstuffs; our consumption of meats is high. This is due to high average purchasing capacity. With high level of income the dollar outlay for food is relatively high, but the proportion of income expended for food is relatively low. With income unchanged, increase in price of bread would not be expected to decrease consumption sensibly, nor would decrease in price of bread be expected to augment consumption sensibly. Substantial decrease in income would hypothetically tend to increase consumption of bread, no matter what the price of bread within a reasonable range, since substitution of bread (low price per calorie) for fruits, vegetables, and meats (high price per calorie) is the common way of reducing the cost of the food supply; but the adaptation has not been marked in the present depression. High consumption of meat in a country like the United States, which has passed out of the cheap meat production of the free range, is the expression of high income. If the meat prices were raised with income unchanged, consumption would tend to be somewhat reduced; if meat prices were lowered with income unchanged, there would be less tendency to increase consumption because the trend (if any) of meat consumption on nutritional grounds is probably downward. If the

price of any one meat were to be substantially raised or lowered out of line with the others, one would expect a sensible reaction in the appropriate direction. If income were lowered, this would find prompt expression in diminution of consumption of meats, beginning for the majority of people with the most expensive kind and the most expensive cuts, convenience and taste considered.

What would be expected for bread and meat may be summarized as follows: The consumption of bread is less elastic than that of meat, with income maintained. With income increased, one would hardly expect consumption of bread to be influenced at all; but the consumption of meat would tend to be enlarged and particularly the consumption of more expensive meats, such as poultry and the choicer cuts of butcher meats. With income reduced, the intake of bread might be increased and that of meats would be reduced. With income maintained, changes in the price of bread upward or downward would have little effect on consumption of bread upward or downward. With income maintained, changes in the prices of meats upward or downward would tend to affect consumption downward or upward. With changes in the price of pork upward or downward, income and other prices maintained, one would expect consumption to be significantly influenced downward or upward. But few such inferences can be proved.

Unverified assumptions in the estimates, variations in production data from year to year,¹ and changes in stocks of pork products have, in our view, as much (or more) effect on the figure computed for per capita consumption as actual changes in ingestion of meats from year to year.² In the absence of marked changes in business conditions, one must assume consumption of pork products

¹ Cf. pp. 81 ff. and 424 ff.

² See chapter viii.

to be relatively constant,¹ except for gradual trends. We doubt whether changes in the domestic demand for pork products are sufficient sensibly to influence the supply and price of hogs, except when business conditions change rapidly and substantially. Even here, demonstration and measurement are difficult.

SUMMARY

In summary, among the many factors influencing the price of live hogs, the following (not all discussed above, since obvious) would seem to be the outstanding: the number of hogs in the country, the supply on the market, the supply expected to arrive on the market within the next few months, the quantity of hog products in storage, the price of corn, the all-commodity price level, general business conditions, the prices of alternative animal products, and volume of exports.² Whether considered broadly or directly appraised, variations on the side of supply have much greater effect than variations on the side of demand. One may hazard the guess that, except under unusual circumstances such as war, the price of live hogs is determined to the extent of 60 or 70 per cent by factors of supply and to the remaining extent by factors of demand. The relative influences of the several factors on the supply side are not the same from year to year, just as the relative influences of domestic and foreign factors on the demand side are not the same from year to year.

¹ "The general levels of demand, both here and abroad, are both important, but ordinarily change only slowly."—Haas and Ezekiel, *Factors Affecting the Price of Hogs*, p. 53.

² Cf. Haas and Ezekiel, *Factors Affecting the Price of Hogs*, p. 53. Ezekiel has studied the problems of forecasting the price of hogs, using several tentative formulas. The work is highly important but has reached no workable conclusion. There are few commodities for which a reliable forecast of price would be more important. Apparently, a forecast of hog prices needs to include the price of corn, the weight of hogs, the corn-hog ratio, intentions to breed, export demand, and prices of industrial stocks.

Wright¹ has suggested that

. . . . the price paid for hogs by the packers is determined somewhat more than one-third by the price of the corn on which the hogs were raised and fattened, a little more by the supply of hogs, and about one-fourth by unknown factors which would include fluctuations in the demand for pork products.

But

. . . . In the long run, the price of hogs is based more on the total supply of hogs in the country and on the [supposed] profits of hog raising as affected by corn prices than on the actual market receipts.

The general conclusions of Haas and Ezekiel² were as follows:

The dominant influences in the hog market, as shown by this study, are (1) the supply of hogs on the market and expected to arrive on the market within the next few months, (2) the quantity of hog products in storage, (3) the general price level, (4) general business conditions, and (5) the prices of alternative products.

Broadly considered, opinions on the subject seem quite concordant. In the above, no attention was directed to foreign demand and prices. The specific question dealing with the effect of world (really European) hog prices on domestic hog prices will now be considered.

INFLUENCE OF EUROPEAN PRICE ON AMERICAN PRICE OF HOGS

To what extent do world prices of hogs and hog products determine American hog prices? In the preceding section we learned that the opinion of the trade, supported by the available mathematical interpretation of statistical data, is that the price of hogs is determined predominantly by factors of supply rather than factors of

¹ Sewall Wright, *Corn and Hog Correlations*, p. 42.

² *Factors Affecting the Price of Hogs*, p. 53.

demand. Contrary to this is the view held widely in farm circles that the prices for which American lard and hams are sold abroad determine largely the price of hogs at home. In *Wallaces' Farmer*¹ stands the following: "The price of hogs is set largely by the price paid in the countries of Europe for the surplus lard and hams that go abroad." In this statement it is not merely contended that factors on the side of demand are more influential in determining the price of hogs than factors on the side of supply; it implies also that, among the factors of demand, changes in export demand have more effect than changes in domestic demand.

The question is not so simply stated as in the case of corn. Do the prices of live hogs in Europe directly influence the prices of live hogs in the United States; if so, under what circumstances and to what extent? Do the European prices of hams, shoulders, bacon, mess pork, and lard influence the American prices of the corresponding hog products? Is it possible to trace to the prices of live hogs in the United States (to terminal prices and to farm prices) the influences which European prices of hog products exert upon the prices of the corresponding American hog products?

It is our view, with purchasing power of money and other general factors regarded as constant, that the current price of hogs in the United States is influenced far more by supply than by demand. Mathematical treatment of statistical data may be essential to evaluate the extent of the preponderance of influence of the factors of supply; but market experience is sufficient to establish the direction. Mathematical treatment of the data might serve to measure the relative influences of the several factors of demand; but again, market experience seems sufficient to make it clear that the influence of foreign demand is

¹ March 13, 1927, p. 6.

secondary to domestic demand. Under these circumstances it follows that the European prices of hogs and hog products do not determine the American prices of hogs and hog products, but influence them in a subsidiary manner, varying in extent and direction from season to season, to an undetermined but probably always minor degree. At the risk of some repetition, it is important to set forth the reasons for this view, since in farm circles an unusual insistence is laid on the opposite opinion.

PRICES OF LIVE HOGS AT HOME AND ABROAD

The hog markets at the public stockyards of the corn belt are large and sensitive to price influences. Railway efficiency in shipment of hogs makes the terminal prices of hogs about as representative as those of wheat and corn. These terminal hog prices possess, however, an added significance, since it is particularly the products of the large packing houses associated with the public stockyards that go into cold storage and are reported as current stocks. Also, the markets in futures of hog products—lard, ribs, and bellies—have their location in the packing centers.

There is no Continental European price of hogs; indeed, it is difficult to find comparable prices in any one country. Hog production in some European countries displays almost as wide proportional fluctuations as in the United States. Usually, the hog markets abroad possess pronounced local characteristics. Only in the Danube countries do hogs of the lard type predominate. Otherwise, live-hog prices correspond to local conditions in the marketing of bacon-type hogs, with stress on particular types of feeding and conformation to favored methods of curing. In a co-operative country specializing in exports, like Denmark, the farm price of live hogs is for the most part subsequent rather than primary; it is arrived at

when the wholesale marketing of the cured products is completed.

In the sense that the price of live animals in the two continents interact directly, a notable influence through traders does not seem to exist. The hog buyer or seller in Chicago does not look at the quotations of live-hog prices of the previous day cabled from European cities in the way that the buyer and seller of wheat watches the Liverpool quotations. And the hog buyer or seller in Copenhagen, London, or Berlin does not have before him the American quotations on futures of lard, ribs, and bellies, in the way that the European buyers and sellers of wheat watch the quotations on futures on the Chicago and Liverpool exchanges. From their representatives in Europe the packers engaged in export of hog products receive reports on the pig crop, the prices and availability of feedstuffs, the trend in outturn of hog products, and the tendency of prices. They know they must seek a partial outlet for their products in Europe, and current demand and advance information on future demand tend to influence their attitude as buyers in the stockyards. If current European demand is good and prospective demand promising, they might feel warranted in offering higher prices; if current and prospective European demand is poor, this might tend to hold offers down. If pork packers were in position more effectively to hedge, their export trade would be less of a market hazard. As it is, the packers in the large centers are practically under effective compulsion to take at the current prices all of the hogs offered and market a fraction of the products several months later in Europe for the best prices they can secure.

Information on the European hog crop, though scanty, would have more importance as indicative of later European demand for imported hog products if the data were available early. Our hog crop year begins on the first of

November. The swine estimates are made in Jugo-Slavia in January; in Italy in March-April; in Switzerland and Hungary in April; in Holland in May-June; in the United Kingdom, Norway, Sweden, and Latvia in June; in Denmark and Estonia in July; in Finland in September; in Poland in November; and in Austria, Germany, Belgium, France, Spain, Czecho-Slovakia, Greece, Roumania, and Bulgaria in December. From the reported estimates of swine, no appraising inference as to the pig crops can be made. Straggling bits of information on the European situation begin to come in after the first of January, when the heavy American marketing is already well under way. Some fragmentary information on current slaughterings is available,¹ but trustworthy indications of the size of the pig crop are scarcely available before early summer.

So long a time elapses between the purchase of hogs in American packing-house centers and the sale in Europe of products derived from them that a comparison of prices of live animals abroad with those at home has doubtful meaning at any time. The European cannot inspect a range of hog prices in Chicago and infer that it implies such and such prices for bacon, hams, lard, ribs, backs, and bellies several months later. Nor can the American, inspecting a range of live-hog prices in European centers infer that it presages such and such prices for the customary European products and ought later to place Americans in position to expect such and such prices for American hog products in the European market. When the European trend, secular or cyclical, is distinctly upward or downward, expressive of abundance or shortage in the pig crop, the American exporter will make the appropriate inference in respect to European prices.

¹ The reported slaughter at the thirty-six most important points in Germany represents only about a fourth of the total inspected slaughter of the country (*Statistics of Hogs, Pork, and Pork Products*, U.S. Department of Agriculture Statistical Bulletin 18, January 1927, p. 71).

In the trend, rather than in current quotations, lies the importance to be attached to European prices of hogs in their effect upon American prices of hogs. In short, so far as live animals are concerned, the European price can hardly exert a direct and sensible short-term effect upon the American price. Sometimes, however, hog cycles in Europe forecast the supply to be expected during the subsequent year.

PRICES OF HOG PRODUCTS AT HOME AND ABROAD

So much for the direct influence of the European price of live hogs on the American price of live hogs. The case is different when hog products are considered. The prices of hog products in Europe do influence the prices of hog products in the United States. This follows when one considers how substantial a portion of the products of federally inspected packing houses is exported. In particular, the price at which lard may be sold abroad must influence the price of lard at home, because nearly half of the federally inspected lard is exported. According to a computation of Haas and Ezekiel,¹ European demand represents 43 per cent of the determination of the demand index of hog products. This is a considerably larger influence than is commonly recognized in the trade, except possibly for lard. But if one were to accept this, in connection with the statement that 60-70 per cent of the price determination lies on the side of supply, variations in exports would exert a substantial influence on the price of live hogs, without, however, supporting the statement that "the price of hogs is set largely by the price paid in the countries of Europe for the surplus lard and hams that go abroad." Beyond this, any recognition of the influence of prices of hog products in Europe on the prices of hog products in the United States implies that fluctuations in

¹ *Factors Affecting the Price of Hogs*, pp. 43-44.

domestic prices of hog products influence proportionally the prices of live hogs in this country, an implication that is not established for lard.

The foreign demand for American hog products (other than lard) is relatively inconstant, at least in relation to the total volume of production. Only federally inspected hog products pass to export, and it is with the volume of slaughter under federal inspection that the volume of exports is to be compared. Before the war the volume of exports of hog products other than lard was slowly declining, and, as is seen in Table 14, in the five years before the war represented only 12 per cent of the pork production reported under federal inspection. After rising to nearly a billion pounds in 1923, the exports of hog products other than lard declined until 1927, when the amount exported was lower than in any of the five pre-war years; in 1928 and 1929 they rose somewhat, but in 1930 they declined to a point even lower than that reached in 1927. The exports of 1931 have been still lower. The exports during the four years 1927-30 were only about 6 per cent of the federally inspected production. Foreign demand, especially European demand, has been steadily declining.¹

The situation is somewhat different for lard. Before the war exports of lard held up better than those of other hog products. During the post-war years the exports of lard have been well maintained. In the five years 1909-13 we exported nearly 56 per cent of the lard produced under federal inspection (an annual average of 932 million pounds), whereas during 1921-30 we have exported about

¹ Henry Wallace had expected the short corn crop of 1930 to put corn prices to \$1 and hog prices to \$11—instead, corn has been below 40 cents and hogs below \$6 at Chicago. Wallace thinks the German crisis was the cause, reducing German imports and depressing American loans that might otherwise have been used to support exports of lard to Germany. (Cf. *Wallaces' Farmer*, July 25, 1931, p. 4.) But surely this explanation is too simple to fit the facts.

TABLE 14.—UNITED STATES EXPORTS OF PORK AND LARD, COMPARED WITH PRODUCTION UNDER FEDERAL INSPECTION, 1909-13 AND 1921-30*

Year	Pork			Lard			Total pork and lard		
	Production under federal inspection ^a (million pounds)	Exports (million pounds)	Relation of exports to production (percentage)	Production under federal inspection (million pounds)	Exports (million pounds)	Relation of exports to production (percentage)	Production under federal inspection (million pounds)	Exports (million pounds)	Relation of exports to production (percentage)
1909.....	3,545	485	13.7	886	462	52.1	4,431	947	21.4
1910.....	3,112	324	10.4	792	382	48.2	3,904	706	18.1
1911.....	3,977	470	11.8	1,010	610	60.4	4,987	1,080	21.7
1912.....	3,802	456	12.0	965	558	57.8	4,767	1,014	21.3
1913.....	3,958	468	11.8	1,006	581	57.8	4,964	1,049	21.1
Average..	3,679	441	12.0	932	519	55.7	4,611	959	20.8
1921.....	4,730	759	16.0	1,379	903	65.5	6,109	1,662	27.2
1922.....	5,157	727	14.1	1,575	799	50.7	6,732	1,526	22.7
1923.....	6,351	960	15.1	1,971	1,075	54.5	8,322	2,035	24.5
1924.....	6,057	735	12.1	1,923	986	51.3	7,980	1,721	21.6
1925.....	5,235	549	10.5	1,452	719	49.5	6,687	1,268	19.0
1926.....	5,099	426	8.4	1,513	733	48.4	6,612	1,159	17.5
1927.....	5,495	316	5.8	1,557	717	46.1	7,052	1,033	14.6
1928.....	6,069	334	5.5	1,750	801	45.8	7,819	1,135	14.5
1929.....	5,911	379	6.4	1,763	866	49.1	7,674	1,245	16.2
1930.....	5,400	314	5.8	1,521	674	44.3	6,921	988	14.3
Average..	5,550	550	9.9	1,640	827	50.4	7,191	1,377	19.2

* Data from U. S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, pp. 8-9.

^a Dressed weight.

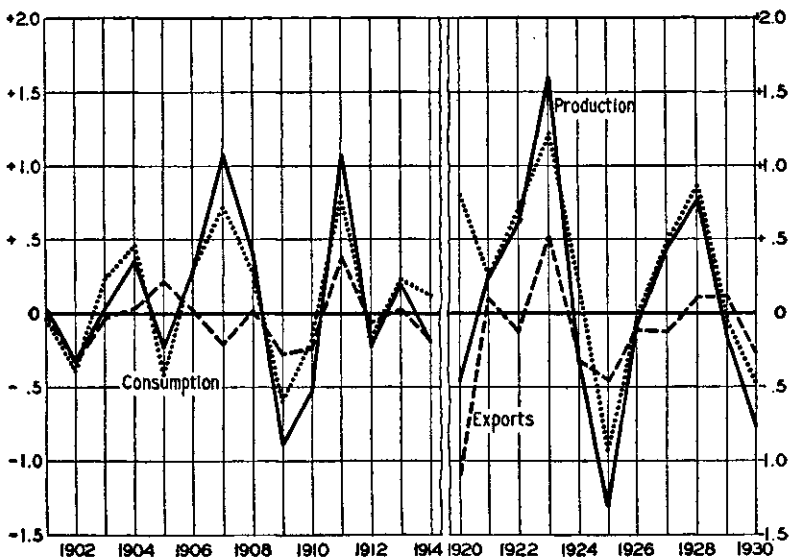
50 per cent of a much larger production (an annual average of 1,640 million pounds).

Some light on the relative effects of changes in domestic production, consumption, and exports may be obtained by contrasting the year-after-year plus-and-minus variations, for which purpose we use the figures for annual production (federally inspected), consumption, and exports as reported by the Bureau of Agricultural Economics, the changes from one year to the next being given in Chart 11.

Discarding the five calendar years 1915-19 as unsuited for the purpose, twenty-five years are left for comparison. In eight of these years both consumption

CHART 11.—ANNUAL VARIATIONS ABOVE OR BELOW FIGURES FOR PREVIOUS YEAR OF PRODUCTION, CONSUMPTION, AND EXPORTS OF PORK AND LARD, 1900-14 AND 1920-30*

(Billion pounds)



* Based on data in Appendix Table XI.

and export rose, thus being associated in the direction of price increase. The average increase in consumption was 550 million pounds and in export 149 million pounds. In seven of the years both consumption and export declined, thus again being associated in the direction of price decrease. The average decrease in consumption was 394 million pounds and in export 246 million pounds. In seven of the years consumption rose while export declined, home demand supporting price increase while export demand tended toward price decrease. The average increase in consumption was 468 million pounds, the average decrease of export was 301 million pounds. Finally, there were three years in which consumption declined while exports rose, years in which the export trade tended to support a declining home market. These three years were 1901, 1905, and 1929, and the average decrease in consumption was 168 million pounds, whereas the average increase in export was 118 million pounds.

The most significant years are naturally those since 1919. In 1920 the extraordinary decline in exports, despite price decline, did not have its influence offset by increase in domestic consumption during the year, though this was the third heaviest increase to be noted in the entire period. In 1921, with heavy price decline, there was a moderate increase in production and consumption and a small increase in export. In 1922, with slight increase in price, there was a heavy increase in production and consumption with a moderate decline in export. In 1923, at lower price, there was the record increase in domestic production and consumption, with a record increase in exports outside of the war period. In 1924, with rising price, there was a decrease in production, a moderate increase in consumption, and a heavy fall in export. In 1925, with further heavy rise in price, there was a pronounced decline in production, in consumption, and in export. There was a moderate decline in production in

1926, despite still higher price, and consumption and exports continued to decline. The year 1927, with substantial decline in price, witnessed increase in production and consumption and further decline in exports. In 1928, with still further decline in price, there was a heavy increase in production and consumption and a moderate increase in exports. In 1929, with a rise in price, production and consumption decreased slightly but exports again rose moderately. In 1930, with decline in price, production, consumption, and exports all declined. This has apparently occurred again in 1931.

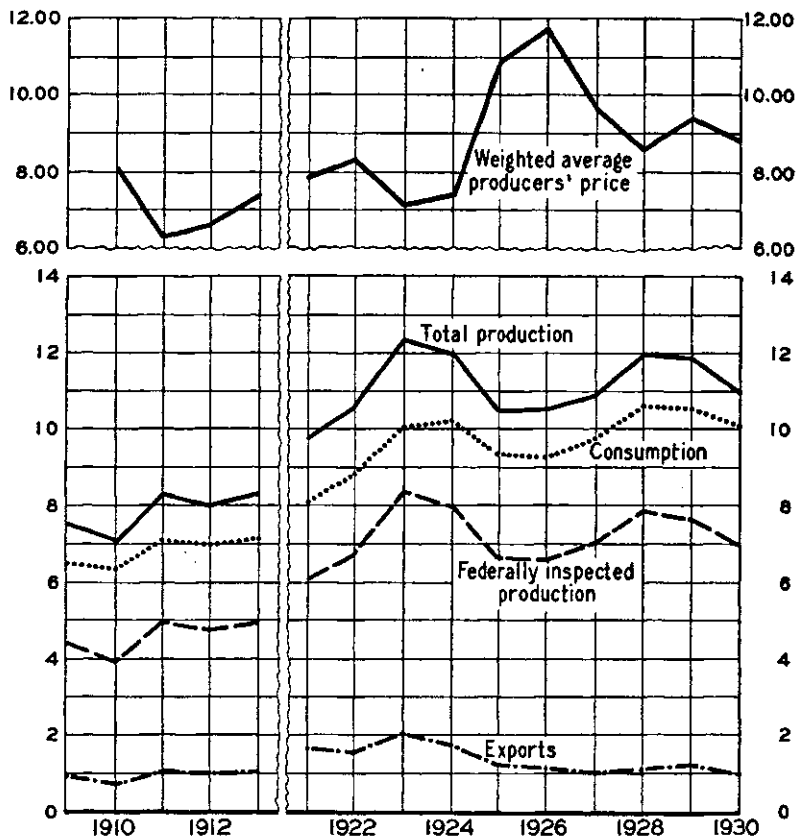
Comparing the increases and decreases in domestic consumption and exports with the average Chicago prices for hogs, one cannot draw the inference that changes in export have been notably and significantly determinative of the domestic price changes.

Chart 12 includes the data for production, consumption, and exports of pork and lard, together with the producers' price of hogs. In this chart we have included the total estimated production as well as the federally inspected production. It is obvious that the chart does not admit of a simple explanation and certainly the controlling variable is not expressed in the curve of exports.

In discussions on "surplus control" it is frequently assumed, expressly or tacitly, that a surplus (amount) passing to export has a different effect on price than a corresponding surplus (amount) disposed of within the country. Interpreting value as the expression of marginal utility, the price of the last instalment determining the price of the entire supply, it would seem immaterial where the last instalment were sold—at home or abroad. Such is, indeed, a common inference in treatises on international commerce. But when it is contended in farm circles that the price for which a surplus is sold abroad fixes the price of the supply consumed at home, something more is implied, and apparently what is sought is

CHART 12.—WEIGHTED AVERAGE PRICES OF HOGS RECEIVED BY PRODUCERS AND PRODUCTION (ESTIMATED TOTAL AND FEDERALLY INSPECTED), CONSUMPTION, AND EXPORTS OF PORK AND LARD, 1909-13 AND 1921-30*

(Dollars per 100 pounds; billion pounds)



* Based on data in *Agriculture Yearbook, 1928*, p. 930, supplemented by data furnished by the Bureau of Agricultural Economics of the U.S. Department of Agriculture.

to make a distinction between marginal vendibility at home and abroad. Marginal vendibility includes two fac-

tors: lessened utility and inequality of income. Lessened utility applies both at home and abroad, though probably not in equal measure. Inequality of income would apply more abroad than at home. In this sense, it might be urged that with the price of the last instalment determining the price of the entire supply, if, as, and when the last instalment must be sold to buyers displaying extreme inequalities of income—whose purchasing capacities are substantially lower than those of the domestic groups of buyers—the price at which such a surplus must be sold abroad would influence the price at home to an otherwise unusual extent. But one may well ponder whether the surplus that thus leaves the country may not, through the foreign price, have less effect on the domestic price than if it remained in the country, to be degraded to lower uses or carried over into the new crop year.

Let us now consider the price material. There is little purpose in comparing American and European prices of dressed hog carcasses, since these are less representative than the prices of live hogs. The tangible comparisons are between the prices of cured products. American exports consist mainly of lard, hams, shoulders, bacon, Cumberland and Wiltshire sides. These products meet in each importing country the local products and also the specialized products of exporting countries like Denmark and Canada.

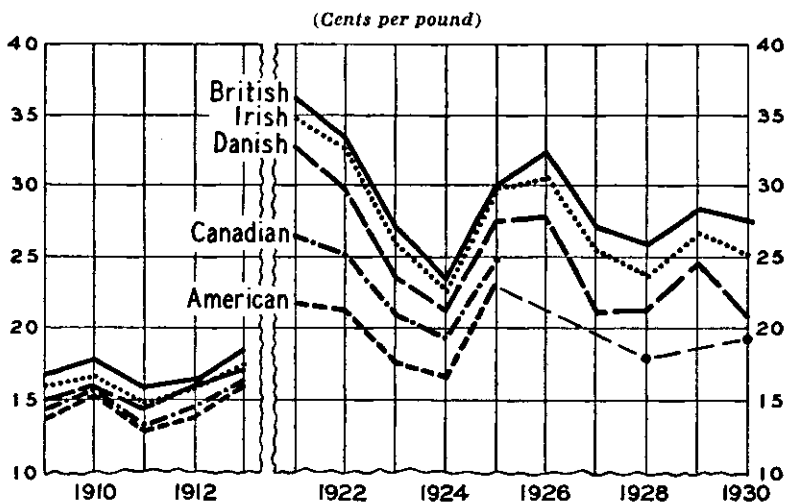
HAMS AND BACON

The qualities of hams and bacon depend both on the raw materials and on the methods of curing. Hams from Westphalia, Prague, Yorkshire, Smithfield, and Chicago, bacons from Wiltshire, Ireland, Denmark, and Iowa, all come from domesticated descendants of *Sus scrofa*; but they are not identical commodities, and they are cured differently, with substantial distinctions in weight, appearance, composition, consistency, and taste. We export

freely hams, shoulders, and bacon that are cut and cured according to domestic standards; but we also export hams and bacon that are cut and cured according to the standards of European countries. We export Wiltshire sides and Cumberland sides cured according to British tastes. We export fresh, semi-finished, and finished cuts,¹ cured according to domestic and foreign standards.

American and European prices of hams, shoulders, and bacon vary so much that comparisons within the range of prices make inferences hazardous. It is, however, possible to contrast the prices of comparable Wiltshire sides as quoted in British markets. Such a tabulation is published annually in the *Yearbook* of the United States Department of Agriculture, and the data are given in Chart 13.

CHART 13.—ANNUAL AVERAGE PRICES OF BACON, WILTSHIRE SIDES, GREEN, FIRSTS, AT BRISTOL, ENGLAND, 1909-13 AND 1921-30*



* Based on data in Appendix Table XII.

¹ See above, pp. 147-51.

The British product carries the highest price; the Irish and Danish sides are next; then follows the Canadian, with the American price a poor fifth. The average difference between the price per pound of the highest class (British price) and the price of the American product was 2.8 cents in the five years before the war and 9.4 cents in the recent years; the smallest difference between the British and the American price was 2.5 cents before the war and 6.9 cents in the recent years; the largest difference between the British and the American price was 3.1 cents before the war and 14.4 cents in the recent years. The Danish and Irish Wiltshires are cured specifically for the British market from bacon-type hogs; probably it is merchandising considerations, plus chauvinism and prejudice, that give the British Wiltshire the higher price. The Canadian product is also cured for the British market from bacon-type hogs; but the imitation is not perfect, and uniformity is stated to be lacking. The heavy discount at which the American Wiltshires must be sold is based on unevenness in size, lack of uniformity, inability to imitate appearance, consistency, and flavor, and disadvantageous merchandising considerations. The American Wiltshire is regarded as the poorest on the British market and takes the fag-end of the Wiltshire price; it is likely to be "unbranded" and of a poor "selection." These differences in prices do not seem to us justified when the several products are served on the tables of hotels in Great Britain; but the fact remains that the heavy discount on American Wiltshires persists year after year.

What is called Midland bacon in Great Britain corresponds to the usual type of American bacon, with weights depending on the heaviness of the animals from which the bellies were secured. Standard American bacon does not grade so far below Midland bacon in Great Britain as is the case with Wiltshires. Under these cir-

cumstances, the price disparity is less; but the range of qualities and prices of Midland bacon in Great Britain and of corresponding products on the Continent is so wide, and the corresponding range in the United States is so wide, that price comparisons yield little information.

Now, how is one to picture these bacon prices reflected directly back to live-hog prices in American terminal markets? Each packer engaged in foreign trade knows what proportion of American cuts enters the export market, cured American style and (initially or finally) cured foreign style. Each packer knows the current prices of the several products in Europe. From these data he may issue instructions to buyers at the stockyards to shade their offers upward or downward. Appropriate animals are always relatively scarce. When current European sales are heavy, the prospects warrant the packing houses in paying slightly higher prices for adaptable pigs; when current sales are small, the effect, if any, would be downward. If the price trend in Europe were upward for the small fraction of the American output, this would favor a higher level; if the trend were downward, the effect, if any, would be downward.

We make heavy export of hams to Great Britain and a small export to the Continent, but even in Great Britain it is not possible to secure trustworthy price comparisons. In Great Britain American hams rank mostly as second-grade. A direct reflection from prices of European hams to prices of American hams cannot be established on account of non-comparability of quotations. But if the hams exported to Europe were left on the home market, this would of course depress domestic prices. It is not so much what the foreign customers pay for our hams and bacon that influences the domestic price: it is what domestic consumers would pay for them if they remained at home that influences the market.

PICKLED AND SALT PORK

There are shipments to Europe of pickled and salt pork in small quantities only (in large amounts relatively to ex-European countries), so that comparisons of prices in this country and in Europe seem to offer no information of importance. Only the fat pieces secured in cutting Midland bacon in Great Britain correspond to mess pork in this country, since the Wiltshire and Cumberland sides contain these cuts. The specifications of the Chicago Board of Trade applicable to bellies, ribs, and fat backs differ so from the practices in Europe as to make comparison illusory. Here again, the price influence lies not so much in what the various foreign markets pay for pickled pork and salt pork, as it lies in the problem of the packers to dispose of their low-grade cuts (as such or as lard) if they remained on the domestic market.

LARD

The position of lard deserves separate consideration. Lard represents the hardest marketing problem of the packer. R. A. Clemen¹ has put the situation succinctly:

For every 100 lb. of pork produced, about 27 lb. of lard are obtained *as a by-product*. For every 100 lb. of pork consumed, only 20 lb. of lard are sold. The balance of 7 lb. finds no market in this country, and must, therefore, be shipped abroad.

The packers in their daily operations visualize the situation of lard by computing at current prices how many pounds of lard will purchase one hundredweight of hog. The higher the price of lard relative to the price of hogs, the better for the packer. In Table 15 are to be found the figures for total values as declared and prices per pound, for 1909-14 and 1921-30, of exports of lard

¹ *By-Products in the Packing Industry* (Chicago, 1927), pp. 181-82. Italics ours.

TABLE 15.—QUANTITY, VALUE, AND AVERAGE PRICE PER POUND OF UNITED STATES EXPORTS OF LARD, COMPARED WITH OTHER PORK PRODUCTS, 1909-10 TO 1913-14 AND 1921-22 TO 1929-30*

Crop year Nov.-Oct.	Lard ^a			Other pork products ^b			Total		
	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)
1909-10.....	364,333	45,168	12.4	327,076	42,666	13.0	691,409	87,834	12.7
1910-11.....	525,698	53,602	10.2	472,793	56,784	12.0	998,492	110,386	11.1
1911-12.....	508,922	52,071	10.2	502,846	59,637	11.9	1,011,768	111,707	11.0
1912-13.....	524,569	59,463	11.3	475,202	61,796	13.0	999,771	121,258	12.1
1913-14.....	451,075	50,339	11.2	395,314	53,659	13.6	846,389	103,998	12.3
Average.....	474,919	52,129	11.0 ^c	434,646	54,908	12.6 ^c	909,566	107,037	11.8 ^c
1921-22.....	742,430	86,813	11.7	660,684	110,576	16.7	1,403,114	197,388	14.1
1922-23.....	1,003,470	123,380	12.3	917,180	134,112	14.6	1,920,650	257,492	13.4
1923-24.....	991,002	129,478	13.1	818,061	113,355	13.9	1,809,062	242,833	13.4
1924-25.....	705,932	120,643	17.1	541,864	104,854	19.4	1,247,796	225,497	18.1
1925-26.....	701,612	111,337	15.9	445,539	94,305	21.2	1,147,150	205,642	17.9
1926-27.....	674,980	91,736	13.6	317,862	60,658	19.1	992,842	152,394	15.3
1927-28.....	718,140	94,375	13.1	324,066	53,370	16.5	1,042,206	147,745	14.2
1928-29.....	820,092	105,781	12.9	350,498	62,119	17.7	1,170,590	167,900	14.3
1929-30.....	718,130	82,637	11.5	310,849	55,090	17.7	1,028,979	137,727	13.4
Average.....	786,199	105,131	13.4 ^c	520,734	87,604	16.8 ^c	1,306,932	192,735	14.7 ^c

* Data from Monthly Summary of Foreign Commerce.

^a Not including neutral lard.

^b Including fresh and frozen carcasses and loins, hams, shoulders, and bacon, Cumberland and Wiltshire sides, pickled and canned pork, and neutral lard.

^c Weighted average.

and other hog products. The subordinate position of lard is clearly revealed.

A direct relation of exports to price was not always observed during 1909-14. The lowest volume of lard exports did occur in the year of the highest price. In 1912-13 more lard was exported at 11.3 cents than was exported during the previous years at 10.2 cents. Since the war, relations have been quite irregular. Thus, a larger export occurred in 1923-24 at 13.1 cents than occurred in 1921-22 at 11.7 cents. In 1924-25 the price rose to 17.1 cents and exports declined sharply. Since then, although the price of lard has declined steadily, exports have remained at approximately the same level, except for further decline during 1930-31. Of course, domestic European supplies, as well as foreign prices, affect European imports.

It is interesting to observe the wider margin prevailing since the war between lard prices and the prices of pork products. In the five years before the war the weighted average export price of lard was 11 cents, while the weighted average price of the other products was 12.6 cents. In the nine years 1921-30, the weighted average price of lard was 13.4 cents (122 per cent of the pre-war), while the average price of the other hog products was 16.8 cents (133 per cent of the pre-war), representing a substantial widening of the margin. This widening of the margin does not represent a relative premium paid for other hog products, but rather a relative discount on lard. When lard prices decline, this might be compensated for by higher prices on cured products, with live-hog prices unchanged, but this is not to be counted on.

We export all grades of hog fat from inedible grease to kettle-rendered lard. Inedible hog grease from the United States has sometimes been refined into edible lard in Europe. The bulk of our exports is refined prime steam lard. Domestic lards in the different European countries

are prone to have particular qualities, and exporters of American lards must take account of them.¹ Practically all imports of lard into Europe go north of the latitude of the Alps, south of which vegetable cooking oils are preferred. The comparison of lard prices is unsatisfactory because of lack of comparability of grades and qualities in the different countries. Broadly considered, American prime steam lard has sold in the same range of prices as standard domestic lards in European countries, with sometimes a tendency to discount.

There is an obvious interaction between the prices; but which is cause and which effect depends upon the point of view. When one discusses the situation with European pork packers and agrarian leaders, one hears the complaint that they are compelled to sell their lard at a loss to meet the price of "dumped American lard." Some Americans say the Europeans set the price; some Europeans say we do. It seems logical to infer that in any season the primary influence on price, whatever the extent, would lie with the side having relative overproduction. Hog producers both in the United States and in Europe are selling the fat for a relatively low price and the lean for a relatively high price. In a sense, the lard trade of Europe is a pool into which producers in both Europe and the United States pour a by-product. Grant-

¹ To a large extent, though the proportion is not computable, American lard in Europe is re-processed before being placed on the retail market, domestic lard being often blended in. Each European country has slightly different standards for lard. The specifications of American prime steam lard have been based on the regulations of the Bureau of Animal Industry and the standards of the Chicago Board of Trade, and to some extent were the reflection of large-scale rendering operations. Each packing house produces one or several kinds of lard better than prime steam lard. The importers in each European country re-process lard to make it resemble the standard domestic lard, and presumably the re-processed lard commands a price over the imported lard more than sufficient to cover the cost of re-processing. In short, it holds for lard, as for hams and bacon, that the American product does not measure up to the best standards in importing countries and secure the corresponding price. American lards are now subjected to refinement for export and presumably will be less subject to remixing. See below, pp. 554-56.

ing an interaction between the prices in the two countries, American lard price leading in some years and European lard price leading in others, this circumstance does not imply that the prices of live hogs in the United States and in Europe are directly and correspondingly affected. With the prices of live animals and of lard viewed side by side, year after year, it is impossible to feel convinced that as a rule the prices of lard directly affect to a substantial extent the prices of live hogs either here or abroad.

But the trend of prices has influence. *Other things being equal*, the prices of lard would tend to be reflected back to the prices of live animals on both continents, to the extent of the proportion of the value of lard to the total value of all products. "Other things being equal" means a great deal, for it includes the prime products of the hog, and lard is a by-product. If Europe were importing from us a billion pounds of inspected lard a year instead of half a billion pounds, this would tend to influence hog prices favorably in the United States and unfavorably in Europe; but how much and how long would depend upon varying circumstances. Exports influence domestic prices, and domestic prices influence exports. Foreign sales relieve pressure on domestic storage stocks; pressure of domestic stocks provokes consignment shipments to foreign countries.

The method of conducting the export business in lard illustrates the subsidiary nature of the business. There is a certain current export. Beyond that, when American packers feel the pressure of accumulating lard, it is shipped abroad usually to packers' branches, or to brokers in provisions, to be sold for what it will fetch. Under these circumstances, it is not surprising that the monthly averages of prices of comparable lards at Chicago and Liverpool are about equivalent. In recent years, judging by prices, American lard has sometimes sold abroad

below the basis of the domestic price. Little lard is sold abroad on contract or on orders for deferred delivery or on the basis of futures. It tends to be a hand-to-mouth business. If American wheat were exported to Europe on open consignment and thereafter merchandised to millers and merchants, the export wheat trade would resemble the export lard trade. Increased export of lard is as frequently a sign of lessened strength in the domestic market as of increased demand in the foreign market. Failure of European demand is equivalent to increase in domestic supply, which must then be equated with domestic demand in a lower price.

Over a hundred packing houses are engaged in export trade in hog products,¹ some exporting regularly, while others export only occasionally, to relieve accumulations of stocks. Small packers accept occasional foreign orders placed through export brokers, selling on the f.o.b. basis. The large packing companies maintain branches and otherwise have their own agents in many importing countries, and maintain stocks, which are carried either in public or private warehouses, especially in the free ports of Europe. In their foreign sales the packing houses endeavor to follow c.i.f. price cards, based on prices in the United States, but must sometimes accept less. A small fraction only of the products are sold before they are shipped over. In effect, the large packing houses export on open consignment and sell the goods to the best possible advantage, i.e., for what they will fetch. When a European importer of wheat appears on the American market in the person of an American exporter, he bids on the open grain exchanges in competition with American grain dealers and millers. The European importer of pork products and lard does not comparably appear as a bidder on the American market.

¹ A number of packers are combined in an export corporation under the Webb-Pomerene Act, which has not, however, seemed to work satisfactorily.

The annual difference between the volume of current domestic production and the volume of sale in export markets represents the volume that must be sold on the domestic market during the year, unless carried into the next year. Cold storage is relatively expensive, and, with heavy slaughter in prospect after the first of January, packers are not inclined to build up stocks at the end of the calendar year. Indeed, December 1 stocks in cold storage are usually the lowest of the year. If the volume of hog products that must be sold in the United States is smaller, prices will tend to be higher; but if the amount is larger, prices must be driven down in order to move the provisions. The packing houses buy hogs extensively in the country and accept all deliveries at the public stockyards in packing-house centers; the volume of their receipts is not of their choosing.

The circumstances have been well illustrated during the past five years. Using the calendar years 1923-30, inclusive, we combine in Table 16 reported production of federally inspected pork and lard, then add to the figure the inward carryover of cold storage stocks on January 1 and subtract the outward carryover of cold storage stocks, thus securing for each year the gross supply of federally inspected pork products and lard. From these figures are then subtracted the net exports, the remainder representing for each year the net supply domestically merchandised.

Now, if in any year all factors were constant except exports, a variation in export would result in a corresponding change in the figure for net supply. But when both gross supply and exports are subject to independent variation, the effect on prices would be most pronounced if exports were to decline in a year when production increased. In 1926, after exporting 1,147 (net) million pounds of pork and lard out of a gross supply of 6,604 million, only 5,457 million pounds were left for sale on

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TABLE 16.—UNITED STATES PRODUCTION OF PORK AND LARD UNDER FEDERAL INSPECTION, STOCKS IN COLD STORAGE ON JANUARY 1, GROSS SUPPLY, NET EXPORTS, AND NET SUPPLY, 1923-30*

(Million pounds)

Year	Total production of federally inspected pork and lard	Stocks in cold storage on January 1	Gross supply during year	Net exports	Net supply
1923.....	8,322	619	8,183	2,034	6,149
1924.....	7,980	758	8,030	1,714	6,316
1925.....	6,687	708	6,880	1,260	5,620
1926.....	6,612	515	6,604	1,147	5,457
1927.....	7,052	523	6,997	1,012	5,985
1928.....	7,819	578	7,642	1,124	6,518
1929.....	7,674	755	7,726	1,238	6,488
1930.....	6,921	703	7,051	984	6,067
1931.....	.....	573*	.....	.....	.....

* Data from U.S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, pp. 8-9; *Agriculture Yearbook, 1931*, p. 854; and *Crops and Markets*, February 1931, VIII, 70.

† The figure for stocks in cold storage on January 1, 1931, is included in the table as it is necessary in computing the net supply for 1930.

the domestic market, the smallest figure in the period. In 1927, only 1,012 million pounds of pork and lard were exported out of an increased supply of 6,997 million pounds, leaving 5,985 million pounds to be sold on the domestic market. In other words, in 1927 the packers had to sell on the domestic market over 500 million pounds more of pork products and lard than they sold on the same market in 1926. This additional sale of a half billion pounds had to be accomplished in competition with other meats and with pork and lard produced outside of federal inspection. Naturally, such a forced sale was accomplished only at lower prices. The years 1928-30 represented comparable situations of high domestic supplies.

From this point of view, the effect of foreign demand is in a limited sense primary. *Other things being equal,*

the larger the export, the smaller the net supply remaining for sale on the domestic market and the higher the resultant wholesale prices to be reflected back to live-animal prices. The smaller the exports, the larger the net supply remaining to be consumed on the domestic market, and the lower the resultant wholesale prices to be reflected back to live-animal prices.¹

It is possible to reverse the statement in a reasonable manner. The packers engaged in export trade might concordantly reason after the following trade fashion. The country has a certain supply, more than can be disposed of at what might be regarded as normal prices in relation to the existing prices of competing animal products. If the supply is forced on the domestic market, this would reduce the prices of hog products to a point out of line with the other prices. Under these circumstances, it is felt better to maintain the domestic prices of hog products at the desired point by sending an appropriate added quantity abroad. The exports would need to be sold at prices dependent upon conditions of supply in the importing countries. Under such circumstances, when exports are shipped out for the purpose of protecting domestic prices, it is far-fetched to urge that the prices at which the exports were sold abroad have driven down the domestic prices below the level that would have ruled if there had been no export. When the supply is large, the prices at which exports must be sold abroad react upon domestic prices; but it is equally true that because a fraction is sold abroad at a low price the domestic price on the remainder of the supply is higher than it would

¹Incidentally remarked, the prices of cattle and sheep are low, as are also those of oats, rye, and hay, though it is not contended that these are depressed by foreign influences. Also, the prices of poultry, eggs, milk, cheese, and butter leave much to be desired. For the corn belt as a whole it is to be remarked that prices are about as unsatisfactory for farm products of which we are net importers, or in balance, as for those of which we are net exporters.

have been if the entire supply had been merchandised at home.¹

The views of the trade may be expressed in the following quotations from the *1927 Year Book of Swift and Company*, page 47:

When there is a big supply of pork, the price is naturally low, and the rest of the world can afford to buy our surplus. When the supply is light, as during 1926, American consumers bid up the price of pork, and foreign purchasers cannot afford to buy so much of it.

Also, in the *1928 Year Book*, page 5, is the following:

A slump in foreign demand, which continued throughout most of the year, made it necessary to sell unusually heavy stocks of pork and lard on the home market.

According to the Institute of Meat Packing, export of meat products "helps to stabilize prices by taking greatly increased quantities of pork products when prices are low in the domestic market"; also, "Judging by the experience of the past fifty years, the volume of exports is chiefly regulated by the level of domestic prices which in turn is affected by the volume of production."² In this view, it is not the price at which the American lard must be sold abroad, but rather the failure to sell the lard abroad that reacts most on hog prices in the United States.

The packing-house view is broadly in accord with that

¹ Cf. *Wallaces' Farmer*, July 1, 1927, p. 5, which contains the statement that it is reported from Germany that hog receipts in German markets were very large in May 1927, and it is suggested that the fall in hog prices in the United States was the result of increased marketing and low prices in Germany. During this period, however, Germany was taking but small amounts of American lard. From this standpoint, therefore, it is not the price at which the American lard must be sold abroad, but the failure to sell the lard abroad, that reacts on hog prices in the United States.

² L. D. H. Weld, A. T. Kearney, and F. H. Sidney, *Economics of the Packing Industry*, "Part I—History and Organization" (published by the Institute of Meat Packing, the University of Chicago, and the Institute of American Meat Packers, Chicago, 1925), pp. 216-17.

recently expressed by a representative agricultural writer, Knute Bjorka,¹ as follows:

1. It is quite evident that the foreign outlet for hog products and particularly for lard, supports the domestic prices of these products and therefore the domestic price of hogs to the original producers, thus enabling the Corn Belt farmer to use a larger percentage of corn and of his corn growing resources in a more remunerative way than would be possible if this source of demand were cut off.

2. The periodic rise and fall in the volume of exports of these products leads us to believe that the export outlet serves as a buffer against the price depressions which might otherwise result from the cyclical nature of our hog production. It is during the time when farmers in the United States are producing the largest number of hogs and slaughter house products are available in largest quantity that the export movement comes in to relieve the glut and save the price situation to some extent.

In short, foreign demand for hog products, like domestic demand, is more continuous and stable, less fluctuating, than domestic production. Fluctuations in hog prices are therefore primarily referable to fluctuations in volume of production, not to variations in consumption representing effective demand.

SUMMARY

It seems to us that the influence of foreign prices of hogs on domestic prices of hogs may be expressed somewhat as follows. The export trade represents an important outlet for packing houses, whereby volume of operations is enlarged, something nearer capacity operation assured, disposition and storage of products facilitated, unit costs lowered, and gross income expanded. In particular, the ever present burden of lard, accentuated by competition with lard substitutes, is somewhat relieved by export. Other things being equal, also, the profits de-

¹ *International Trade in Pork and Pork Products*, p. 4.

rived from foreign sales and from the enlarged operations contingent thereon, with somewhat higher domestic selling prices, ought to make it possible for packing houses to pay a higher price for live hogs as reflected in averages, depending upon the margin on which the foreign sales are consummated. The influence of exports possibly contributes more effect when domestic conditions make for low prices than conversely. Stocks of hog products in cold storage may be held to influence the packers' price of live hogs in somewhat the same manner as export prices. Foreign demand takes up slack in the pressure of domestic supply. When foreign sales are low, more is left to be sold on the domestic market; when foreign sales are high, the domestic market needs to absorb less. From this point of view it would seem that exports of hog products serve to stabilize domestic prices rather than to determine them.

Though a direct influence of exports and export prices on current hog prices cannot be measured, clearly two kinds of effects are discernible. When domestic hog prices are high, curtailment of importers' takings in foreign countries tends to prevent our prices from going higher; when domestic hog prices are low, enlarged takings by importers in foreign countries tend to prevent our prices from going still lower. Secondly, volume of exports has an indirect and subsequent effect. Large exports mean heavy slaughterings, which involve heavy marketings, which tend to favor a higher price for corn, particularly in the event of a short crop. Thus, heavy exports may have an influence on the subsequent corn-hog ratio and on the hog cycle. In fact, exports may influence not so much the current price of hogs directly as the conditions of subsequent production of hogs. This has been well put by Wallace,¹ as follows:

¹ Henry A. Wallace, *Agricultural Prices*, p. 65.

Unquestionably, there is a very close relationship between hog exports and the general level of corn prices [and sequentially of hog prices]. We do not mean to say that there is a month-by-month relationship or even a year-by-year relationship. We do mean to say, however, that it is impossible for the United States to export an unusual volume of hog products without sooner or later raising corn prices. It may take a year or two for the effect to be felt by corn, but sooner or later the influence seems to be inevitable.

In other words, European demand as expressed in American exports may not influence much the current prices of corn and hogs, but later tends to raise corn prices, which will influence hog production, other things being equal. Except in so far as packers may take account of this long-trend effect in current operations, it would follow that foreign demand is not directly equated in current hog prices. Since this is true, and domestic demand is relatively constant, it would seem to follow that current hog prices are determined largely by considerations on the side of supply, and that American hog prices are not determined by European (world) prices.

The price level of hogs in the United States, being predominately influenced by factors of supply, is primarily fixed by domestic conditions. With overproduction of hogs and low prices in this country, the price would be made worse by low foreign demand and somewhat improved by high foreign demand; with a short supply of hogs and high prices, variations in export demand would be expected to have little effect in either direction. With prosperity and purchasing power of currency constant, one may surmise that the determination of three-fourths of the price changes depends on factors of supply, with one-fourth depending on factors of demand. On the side of demand, changes in consumption of hog products and shifts in domestic prices of substitutes are perhaps more important than variations in export sales. Thus, the subsidiary, but still important, influence of world price of

hogs on American price of hogs is seen in its proper perspective—a minor factor in price, not the determining factor.

Since for corn even less than for hogs is there warrant for ascribing to foreign prices the determination of domestic prices, when we combine corn and hogs as a unit agriculture, it is incorrect to say that the level of domestic prices in any year is determined, or largely set, by world prices of corn and hogs. The prices of these crops sold for domestic consumption are determined largely by domestic conditions and not by the prices received for the exportable surplus.

THE POST-WAR POSITION OF CORN GROWERS AND HOG RAISERS

Introduction—Methods of appraisal—Farm operation and accounting—Gross values of corn and hog crops: Gross value of corn crop; Gross value of hog crop—Relative position of corn and hog prices—Change in the value of gold—Cost of raising corn and hogs—Burden of transportation expense—Land values—Farm debt—Farm taxes—Supply, quality, and cost of farm labor—Spread between producers' and consumers' prices—Cost of living—Contrast between farm income and urban income—Summary: major causes of difficulties

INTRODUCTION

In this chapter we undertake to state the case of the complainant in the corn belt. Opinion in the corn belt is not a unity; there is a reactionary right wing in the town as well as a radical left wing in the country. But there is a large body of moderate and objective opinion which we here endeavor to reflect. The case of the corn belt has not always been stated with discernment and discrimination; also, hearsay is intermingled with evidence. In a situation inherently complex, equity is as elusive as it is desirable. Technical difficulties are involved; the adequate exposition of the case (and, correspondingly, analysis and criticism) is hampered by lack of appropriate data and is encumbered with unsettled questions of accounting and statistical procedure. The farmer in the corn belt is not always his own best spokesman; in some ways his case is well presented by the rural press, in which *Wallaces' Farmer* has long been an outstanding figure. Probably the case has been best stated by experts in the state colleges of agriculture. We have drawn views and materials from many sources in order to construct a representative statement of the situation. We shall later have

occasion to express dissent in some particulars in respect both to fact and to interpretation. At this place we are solely concerned in offering a faithful reflection of the corn belt's view of the corn belt's difficulties.

METHODS OF APPRAISAL

A judicious and convincing appraisal of the position of corn growers and hog raisers over the entire country is entirely impossible, particularly in view of wide variations in cultivation practices in different parts of the country. But an approximate appraisal of the position in the corn belt is approachable, though difficult.

No satisfactory information is available on the net returns for the enterprises of corn growing and hog raising over a period of years. In an appraisal of the position of corn growers and hog raisers one must have recourse to many factors, including the gross values of the corn and hog crops, the positions of corn and hog prices in relation to prices in general, the cost of raising corn and hogs, rates of transportation, value of gold, and land values, mortgages, and taxes on owner-operated farms. Each of these sets of data is incomplete, lends itself to being overstressed, and is susceptible of misinterpretation. However, they supplement each other and provide, if not statistical precision at any point, an approach to a correct view of the position of this group of farmers. As background to the consideration of the present position of farmers in the corn belt, it will not be out of place to state the social position of the agriculturist in this region.

The traditional American farmer is a many-sided individual. He is investor, entrepreneur, laborer, and subsistent resident. But he is master of his land, not servant; in the European sense, we have no agrarian class. Probably a majority of corn-belt farmers do not feel tied to the land; they count on sometime selling out at a profit

on the investment. Land in the corn belt is being continuously bought and sold and the going market for land and the trend of land prices are accepted as the outward signs of prosperity; an active demand for land has long been regarded as quite as important as good prices for crops.

Farm management and manual work represent the functions of the farmer as entrepreneur and laborer. Combining management with manual labor, farmers in the corn belt incline to regard their services as comparable in value with the wage of the skilled artisan in the country town.

Farming has always been a mode of life as well as an occupation and, as such, to some extent affords compensations and advantages.¹ For a considerable fraction of American farmers, working a farm is a part-time occupation, just as running the petty factory, or the small retail store is often a part-time occupation: to a considerable extent, farmers working their farms increase their cash income by labor outside the farm. In the corn belt, however, agriculture is for the most part so well diversified that farming is practically a full-time occupation, except for outside income obtained in the care of public roads. Indeed, in this area there is so much work in the care of dairy cows and poultry that the farm women and younger children contribute a substantial (and to some extent undesirable) amount of income-bearing work.

¹The tangible values are tenure and security, and a food supply above the average. Intangible values reside in the charms of country life. Against these stand undisputed defects. Schools, medical attendance, hospital facilities, and social relations are inferior to those of the towns and cities. Health conditions on the farm tend in some respects to be inferior to those in towns. Rural life stands behind town life in convenience and labor-saving equipments; the household life of the farm home entails disproportionate labor on women. On the whole, from the materialistic point of view, it is questionable whether the discomforts of rural existence have not outweighed the comforts. Latterly, improved highways, the automobile, the radio, and rural distribution of electricity have greatly improved the status of country life, but have also made living more expensive although more satisfying.

The farmer in the corn belt feels that he ought to be able, without undue expense, to maintain his buildings and other structures and occasionally to make appropriate enlargements and improvements. Without undue expense, he desires to hold his implements in repair and to keep his practices up to date by timely purchase of new implements. Upkeep of old buildings and structures and occasional erection of new ones not only are necessary in themselves but are of advantage in sustaining the value of farms. Regarding these outlays as a normal part of farm operations, the farmer expects the (selling) price level of farm products to correspond with the (purchasing) price level of building materials, spare parts, and new implements.

Improvements of plants and livestock require the use of tested seeds and selected strains of breeding animals. Since these for the most part cannot originate on the farm, regular purchases are involved, and under these circumstances the farmer expects the (selling) price level of his crops to correspond with the (purchasing) price level of selected seeds and livestock.

The farmer in the corn belt expects to participate in current improvements in the scale of living, including recreation and cultural pursuits. He wishes drudgery lifted from the shoulders of women and girls; he desires his wife to be a home-maker, not a farm worker. The farm will continue to supply to the farm table the customary fruits, vegetables, meats, dairy products, and poultry, though some trend against farm-grown supplies in favor of purchased provisions seems to be observed. Farmers do not regard it as sufficient that farm income should provide for the scale of living enjoyed before the war; what is sought is an increase in net income sufficiently large to support the present scale of living in the country towns. This includes the use of specialties in the diet, modern household conveniences and furnishings, the

automobile, the radio. If, for example, the cost of living in country towns is 120 per cent of the pre-war cost of living after adjustment for price levels, the farmers operating around country towns seek such prices for their products as will enable them to live on the same scale. As an object lesson, the farmer has before him the scale of living of town artisans. It is generally believed in the Central States that before the war the plane of living on the farm closely approximated that in the town, whereas it is now regarded as distinctly inferior. It is the natural expectation of farmers that prices of their products shall be high enough to give them the relative and absolute purchasing capacity necessary to secure for the country the plane of living of the town.

These considerations are germane to the present discussion because they underlie the farmer's basis of judgment of his selling prices, both for crops and for land.

FARM OPERATION AND ACCOUNTING

In the corn belt of the United States, farmers (outside of tenants) tend to be classified as owners of land and operators of farms at one and the same time. The farmer operating his own farm has a subsistence account, an operative account, and an investment account. The dual relation of operator and investor in the farmer working his own farm may be illustrated by comparing him with a landowner running a farm with the work done by a tenant paid a cash wage. Let us assume the landlord pays the tenant a cash wage at the customary rate of farm labor, and allows him also the use of the dwelling, such fuel as the farm may yield, and such foodstuffs as the farmer and his family care to raise. The crops go to the landlord. Out of gross cash income the landowner would pay his taxes, the labor charge, and the upkeep of buildings, structures, implements, and breeding stocks. Any even-

tual balance would represent return on the investment. Whether the landlord could live upon the investment return would depend upon the size of the investment, the rate of return, the cost of living, and the scale of living of the landlord and his family. Whether the tenant could live on the cash wage plus family subsistence would depend upon the wage, the foodstuffs raised for subsistence, the cost of living, and the scale of living of the individual and his family.

Circumstances exist under which both the landlord and the cash tenant would find the returns satisfactory; but circumstances also exist under which neither landlord nor tenant would find the returns satisfactory. And circumstances exist under which either the investment return or the wage return would be satisfactory, but not both. To some extent, farm distress in the corn belt involves circumstances under which neither investment nor operative account is satisfactory. But to a considerable extent, also, farm distress represents circumstances under which only one of the accounts is satisfactory, whereas satisfaction with both was anticipated. The typical farming of the corn belt combines the investment account and the operative account. The owner-farmer is both landlord and tenant; but tenantry is increasing in the corn belt.

In older parts of the corn belt, the investment account receives less attention and the operative account more; in the newer parts, the investment account is apt to overshadow the operative account. In Ohio, the going value of land, the (book) interest return on the plant, and the resale value of the farm are of less importance than in Nebraska, but the operative returns are accorded more attention.

Let us look back to 1900, which marked the beginning of the secular trend of land values that terminated in 1920. Following difficulties both in agriculture and in industry during the 'nineties, from 1900 (or a few years before) on-

ward the purchasing power of gold declined, the prices of agricultural products rose, and the value of land rose.¹ Land values rose more rapidly than commodity values. According to the census, land values for the country doubled from 1900 to 1910 and doubled again from 1910 to 1920. Some of the pre-war increase in land value was due to improvements, but it was largely a gain through increase of population and social development. The land values for the five states Ohio, Indiana, Illinois, Iowa, and Nebraska were 4.8 billion dollars in 1900, 10.1 billion dollars in 1910, and 19.5 billion dollars in 1920. Just what was the average original investment in the farm lands in the corn belt states is unknown, but the figure must have been low contrasted with the 1920 census valuation.

Now, returning to our hypothetical landowner and tenant, let us say the owner purchased his land for \$50 an acre in 1900. The crop of the first year, after paying taxes, labor, and upkeep, returned an interest of 6 per cent on the investment. Each year the land was quoted at \$5 per acre higher; each year the landowner, after paying taxes, upkeep, and labor, expected to receive 6 per cent on the quoted rising value of the land. By 1910, after paying taxes, upkeep, and labor, the sum of money required to represent 6 per cent on the going value was twice as much as in 1900. In 1920, the sum necessary (after paying taxes, labor, and upkeep) to pay interest at 6 per cent on the going value was four times as much as in 1900. In the meanwhile, the rate of farm wage had risen; upkeep also had become somewhat more expensive; and farm taxes had risen by reason of increase in basis of assessment and to some extent also by increase in tax rate.

Unless, now, during the interval the crop yields increased, selling prices advanced, and costs were reduced, one or all, the time inevitably arrived when the gross re-

¹ The discussion is of course limited to values of land in farms.

turn was no longer large enough to cover taxes, labor, and upkeep and pay interest at 6 per cent on the going valuation. Probably year after year, over the whole period, the gross returns (disregarding fluctuations) were large enough to cover taxes, labor, and upkeep and provide interest at 6 per cent on the *original* figure of investment, and in many years somewhat more. But the gross returns did not keep pace with the interest at 6 per cent on the annually increasing going value of the land. Close observers had recognized the oncoming development of this situation even before the outbreak of the war; despite widespread optimism in 1920, students of agriculture recognized that the income from land could not pay the going rate of interest on the going valuation of land. These values came to be recognized as inflated, not based on earnings. The landowner who year after year expected an interest return beyond that on the original investment, a dividend on the going value of land, was in fact expecting an interest return on paper profits—whereas, in fact, the only way to secure the paper profits was to sell the land. Put in another way, the farmer was looking not at original value but at replacement value. The crop prices after the war, the prices that have actually occurred, did not warrant the expectation of customary rate of return on the land values in 1920.

Farmers in the corn belt may now be divided into five groups, on the basis of their investment tenure. In the first group are those who owned their farms in 1900, or acquired them by inheritance. In the second group are those who acquired ownership between 1900 and 1910. In the third group are those who acquired ownership between 1910 and January 1, 1919. In the fourth group are those who acquired ownership at top prices during 1919–20. In the fifth group are those who have acquired ownership during the period of decline in price of land since 1921. These groups represent five distinct investment lev-

els. Their owners are endeavoring (after covering taxes, labor, and upkeep) to pay interest on capital on five different levels of capital actually invested. Also, at the same time, some hope to secure interest on a higher going value of land, irrespective of the original investment.

The farmers in the first group who have comparably good land and management stand in the most advantageous position. They cannot have lost on their original investments. Those who sold their farms cashed in their paper profits; those who did not sell lost a chance to cash in paper profits but continue to occupy their farms under unusually favorable investment conditions.

The farmers in the second group, while occupying a favorable situation, are less advantageously situated in proportion as the prices paid for their lands rose during the decade 1900-10. Those who sold their farms cashed in paper profits; those who still retain them hold them at a relatively low investment value and continue to conduct them under comparably favorable conditions.

Farmers who purchased between 1910 and 1919 did so on a rising valuation of land. Present land values in the corn belt are believed to correspond approximately to those of 1910-12. A goodly proportion of the farmers in this group still have paper profits in their farms; but many of them purchased above the level of present valuations. Contrasted with the farmers in the first two groups, even the farmers in the third group who purchased below present valuations have found it difficult to pay interest on actual investment at 6 per cent after covering taxes, labor, and upkeep. The farmers who purchased at prices above the present valuation presumably find it impossible, after covering taxes, labor, and upkeep, to pay 6 per cent on the actual investment, and many indeed are able to pay nothing.

Landowners who purchased farms at the peak values (often the sons of retiring farmers) now face paper losses

that become real losses when they sell their farms. No level of prices ever received for farm products in this country (not even during the war or directly after) has been high enough to cover taxes, labor, and upkeep, and pay interest at 6 per cent on investments made at the inflated peak prices of land.

Landowners who have purchased farms since the decline in prices occupy a situation somewhat comparable to those who purchased land at around the 1916 level, except in so far as the farms may have run down. Whether prospective prices will suffice to cover taxes, labor, and upkeep, and provide interest at 6 per cent on investments at the price level of 1915-16, remains to be seen. Perhaps the 1910 values will become the base-line.

Now, the proportions of the farmers of the corn belt belonging to these five groups are not known. But of course, with each year, farmers who bought their farms prior to 1910 are retiring.

Farm operations in the corn belt are first to be judged on the basis of interest earned on capital actually invested, irrespective of land values, after payment of taxes, labor, and upkeep. Secondarily, they are to be judged as speculative investments, on the basis of interest earned on current land values in excess of capital actually invested. Conservative farmers appreciate the distinction. To speak of farm distress when a farm will not pay interest on actual capital investment, after paying taxes, labor, and upkeep, is one thing; to speak of farm distress because a farm will not pay interest on speculative land values, above actual capital investment, after paying taxes, labor, and upkeep, is an entirely different thing. To some extent, discussions on farm distress and farm relief have dealt with the second group more than with the first. When it is remarked in the corn belt that farm prosperity depends upon a going market for land at increasing values, that would seem to imply that specula-

tion in land is generally combined with cultivation of land and raising of animals.

Some farmers in their accounting aim first at investment return, others at a wage return. In the first case, out of gross income is first set apart the sum representing interest on investment or on current land value, after which the other items of cost and upkeep are subtracted, leaving a final figure for labor return. In the second case, out of gross income is first set apart a stated figure for labor return, after which the other items of cost and upkeep are subtracted, leaving a final figure for the return on investment or land value.

But, someone will inquire, do farmers really consider that farming should pay a return on the appreciation valuation of the land? If a farmer in the Middle West bought a piece of land for \$100 an acre and a decade later could sell it for \$200 an acre, if he desired to retire, did he then really expect the operative return from the land to pay interest on \$200 an acre? Does the farmer believe that he ought to receive interest on the hypothetical figure of a selling bargain, even though he doesn't take advantage of the selling bargain? Probably, when the farmer gets down to bed rock in his accounting, he really does not expect dividends on land quotations. In a sense, the farmer is somewhat in the position of the merchant who in a period of rising prices tries to set his selling prices on the basis of replacement costs and in a period of falling prices tries to hold his selling prices up to the basis of actual costs. So the farmer tries to get a return on the going value of land when this is higher than the actual investment, and on the actual investment when this is higher than the going value. But he would regard interest on actual investment and interest on market value as expectations of different order—he would expect to receive the one and would like to secure the other. Nevertheless, in discussions on farm distress in the corn belt

the position is widely held that the farmer is entitled to interest on the going value of land, no matter what he paid for it, and such a return is widely regarded as "deferred compensation."

Not only do many farmers in the corn belt expect dividends on going land values, irrespective of capital invested; they have often borrowed money on such expectations, and banks and other money lenders have been willing to make loans on going land values. This was true even in the period of rapid speculative inflation of land values, as in 1919. A considerable proportion of the farm mortgages contracted in the corn belt between 1910 and 1920 represented borrowing on the basis of rising land valuations. That landowners might desire to borrow on speculative values is readily understood; but that money lenders were so willing to lend on speculative land values is less readily understood. This speculative tendency on the part of money lenders in the corn belt is one reason why since 1921 so many country banks have closed their doors with their portfolios packed with frozen loans.

Census reports make it clear that while farmers as a class may expect or hope for dividends on rising land values in excess of capital investment they differ in their attitude toward borrowing. The fact that something close to half the farms in the corn belt were kept free from mortgage debt from 1900 to 1920 establishes a fundamental classification. One group of farmers felt it safe, advantageous, and desirable to take on and expand mortgages based on the year-by-year valuation of their lands. The other group of farmers did not feel it wise, advantageous, or desirable to make use of available borrowing power to place mortgages on their farms. In part, the divergence may have represented different attitudes toward improvements. Some farmers borrowed to extend their holdings; in many cases they borrowed on one land speculation in order to enter another land speculation.

Some farmers borrowed in order to improve their scale of living. Others borrowed in order to make investments, or speculations, outside of farming. Just what proportion of the farm-mortgage increase in the corn belt between 1910 and 1920 would be classified as constructive by experts in farm management, is not known; but it is clear that during 1919-20 there was much ill-advised expenditure on the farm as well as a great deal of investment and speculation not connected with farming. Had the banks and other money lenders of the corn belt limited their loans between 1910 and 1920 strictly to constructive and productive ventures, conservatively appraised from the standpoint of farm management, the farmers of the corn belt (and the bankers and merchants of the region) would have faced the deflation of farm prices with reserves instead of in an overextended position. If the representative farmers of the corn belt, as a class, had been in the position of that proportion who were free of farm mortgages,¹ farm distress would have been far less conspicuous. When the farmer is reproached for borrowing too freely, he makes the rejoinder that he based his borrowings on going land values and crop prices and his banker approved his acts.

On the one hand are many conservative and "old-fashioned" farmers in the corn belt who own their farms, had kept them up, had no mortgage debt in 1910, none in 1920, and none in 1930. Many of these farmers in addition had built reserves, drawing interest or dividends in one way or another. When current operative returns were high, they increased their reserves or expanded their scale of living or both. When current operative returns were low, they contracted their scale of living, added less or

¹ Unfortunately, many farmers who did not themselves mortgage their holdings placed their reserves in country banks and later suffered heavy losses (as bank shareholders or depositors) through frozen loans on the holdings of their borrowing neighbors. Many farmers have felt forced to borrow since 1925 who at that time carried no mortgages.

nothing to the reserve account, or may have drawn from it to tide over a poor year. They paid little attention to paper profits in the rising values of the farms from 1910 to 1920 and little attention to the paper losses in the declining values of the farms from 1920 to 1930. They profited with rising prices of products and falling value of gold from 1910 to 1920; they lost with falling prices of products and increasing value of gold from 1920 to 1930. They have now to pay the high taxes set up in the period of inflation. But they do not have to pay interest on loans contracted in a period of credit inflation, with crops sold in a period of deflation.

At the other end of the scale stand the venturesome farmers who staked everything on the price of land, and who cannot as operators meet the obligations contracted as investors. These owners (in the same net position as townspeople who bought, improved, and equipped farms at peak prices) now find it impossible to secure from tenants, no matter how technically competent, in the shape of cash rent or share rent the sums annually necessary to meet their commitments. As operators, they find it impossible to pay taxes and interest and pay themselves wages. The strictly operative problems of the strictly operative farmers—even under conditions of distressing disparity between prices of raw materials and of finished goods, with low purchasing power of farm products for the goods and services desired on the farm—clearly are different from those of the farmers who have mixed operative farming and land speculation.

Historically considered, our land-settlement policy following the Civil War held out to pioneers the incentive of increase in land value as recompense for the hardship of frontier development. The gist of this policy was stated, in retrospect, by W. L. Harding, president of the Great Lakes-St. Lawrence Tidewater Association, as follows:

We held out to our farmers as a reward for their labor, not a fair return in cash for the crops harvested, but an increasing equity in the lands themselves, as the country might settle up and the value of the lands might increase.¹

With full appreciation of frontier hardships, it was inevitable that the time should arrive when a continuing "increasing equity in the lands" could no longer be maintained. Also, a time arrived when frontier development ceased and speculative promotion entered. It was the peculiar misfortune of the Middle West that upon the frontier growth in land value was superimposed an inflation of land price growing out of the World War, and that the transition from investment return to operative return occurred simultaneously with a heavy deflation in land values and prices of agricultural products. It is pertinent to recall that similar agricultural crises have previously occurred in our country (though regional and on a small scale) as a result of extension of frontier settlement and competition in the older areas with the products of new frontier land.

To a considerable extent, during the past half century, farmers in the rapidly growing sections of the country have been willing to work for little more than subsistence, scarcely more than breaking even on their operations, with the expectation eventually of retiring with a competence secured by the sale of the farm. There are illustrations in plenty in the Central States of farmers who bought land below \$50 an acre, worked hard through long hours, denied themselves comforts, lived below the current scale of living, and later with the approach of old age sold their farms for from \$200 to \$400 an acre. The capital sum finally received, if spread over the entire period, would probably have represented no more than the country-town wage for semi-skilled labor. The eventual cash-

¹ "What the St. Lawrence Waterway Means to the United States," *The Annals*, January 1928, CXXXV, p. 85.

ing-in, by the sale of the farm, was commonly referred to as "deferred compensation." It is impossible not to sympathize with the expression.

To an extent not fully appreciated, farming in the newer sections of the country has thus been conducted for land values rather than for operative returns. It is only when land values decline and the prospect of "deferred compensation" disappears, that the inadequacy of operative returns becomes fully apparent. Up to 1920, the farmers of the corn belt did not need to be highly critical of the quality of land, skill in management, and farming efficiency; they were relatively indifferent to costs of improvements; they were able to tolerate low prices for their products—this all because continuing increases in land values represented to them a blanket insurance. Broadly stated, the growth of society brought to them (over two decades) increase in the value of property at the rate of, let us say, 7 per cent at compound interest. Under these circumstances, fluctuations in operative returns, varying all the way from out-of-pocket losses to notable cash profits, remained of relatively secondary importance. But when compound interest ceased to work for the farmer, then the years of operative cash profit were found to be few and not highly remunerative, while the years of out-of-pocket losses became disastrous.

The historical notion that the farm is the preferred source of the nation's population is pretty well exploded, along with the idealistic concept that rural life yields an invaluable psychic income. Farming is indeed a mode of life as well as a vocation; but after all, no mode of life is satisfying if it is not combined with a gaining occupation. Farming, like other industries in the system of price economy, must operate at a profit if it is to fulfill its function. Operating established farms at a profit means selling crops at a profit, not running real estate ventures at a profit.

GROSS VALUES OF CORN AND HOG CROPS

Since the war the United States Department of Agriculture has engaged in the appraisal of gross valuation of crops. Accurate measurements are not possible because there is no way of weighting sales with prices. However approximate the results, nevertheless the appraisals are of value because they are comparable from year to year.

GROSS VALUE OF CORN CROP

If one were to aim at a comprehensive and refined accounting of the value of the corn crop (including both cash price and product price), the total outturn would need to be segregated into fractions in accordance with disposition, as follows:

- (1) sold as cash corn, and
- (2) fed on farm where grown—
 - (a) to work animals and breeding stock;
 - (b) to merchandised hogs;
 - (c) to merchandised beef cattle;
 - (d) to dairy cattle;
 - (e) to merchandised sheep;
 - (f) to merchandised poultry.

Obviously, several of these fractions overlap, and few are determinable directly. The cash price of corn on the farm could be safely used as the basis for computing the value of the crop only if the factors in the conversion of corn into animal products were taken as constant from year to year and from region to region, and if the prices of the products were comparably determinable. But nothing of the sort obtains. Even the conversion ratio of unit of corn to unit of live weight of animals varies surprisingly from region to region, from farm to farm, and from year to year.

The corn sold for cash and fed to hogs and cattle rep-

resents the largest disposition of the corn crop.¹ In estimating the value of a crop, the major factors in price determination ought to receive more consideration than minor factors, a weighted estimation, which would mean that the hog price ought to receive more consideration than the cash corn price. Since we possess an average weighted farm price of cash corn, and average weighted farm prices for hogs and beef cattle, it would be possible, weighted with assumed equivalents, to compute an average farm value of corn (direct and indirect) that would cover the major portion of the crop. But the assumptions in respect of conversion of corn into animals are of such low validity and the items omitted are so important that we have not attempted such a computation.

The true value of the corn crop depends upon the outcome of a complicated disposition of several joint products over a considerable period; therefore, it cannot in any one year be computed directly from the price of cash corn. Some idea of annual farm returns may, however, be obtained from estimates of gross values of the crops. The United States Department of Agriculture reports an average monthly farm price of corn, and also a weighted average price for the crop year November-October. From the weighted average farm price and the reported crop yield an estimate of the gross value of the corn crop may be computed. Thus are derived the values for the corn crop given in Table 17. The method assumes that the corn retained on the farms had the same grade as the corn sold for cash, an untenable assumption, since the soft corn is used on the farm and the proportion of soft corn to sound corn varies from year to year. These figures are comparable from year to year, in the sense that they are uniformly compiled; but it does not follow that they are internally comparable from year to year.

¹ See above, pp. 49 ff.

To complete the table, we have included also the values in terms of 1913 (wholesale) dollars.

TABLE 17.—PRODUCTION, FARM PRICE, AND HYPOTHETICAL VALUE OF THE CORN CROP, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*

Crop year Nov.-Oct.	Production (million bushels)	Weighted average farm price (dollars per bushel)	Hypothetical farm value of total crop (million dollars)	Adjusted farm value of crop (million dollars)
1909-10.....	2,572	0.632	1,626	1,594
1910-11.....	2,886	0.535	1,544	1,658
1911-12.....	2,531	0.688	1,742	1,776
1912-13.....	3,125	0.567	1,772	1,768
1913-14.....	2,447	0.718	1,757	1,784
Average.....	2,712	0.628	1,688	1,716
1921-22.....	3,069	0.543	1,666	1,136
1922-23.....	2,906	0.767	2,229	1,439
1923-24.....	3,054	0.840	2,565	1,717
1924-25.....	2,309	1.058	2,443	1,545
1925-26.....	2,916	0.710	2,070	1,356
1926-27.....	2,692	0.749	2,016	1,377
1927-28.....	2,763	0.852	2,354	1,592
1928-29.....	2,819	0.850	2,396	1,637
1929-30.....	2,614	0.798	2,086	1,554
1930-31.....	2,094	0.549 ^a	1,149	1,040
Average.....	2,724	0.772	2,097	1,439

* Data from *Agriculture Yearbook, 1931*, pp. 615 and 625, and *Crops and Markets*. Adjusted farm value obtained by use of November-October averages of monthly index numbers (on the 1913 base) of the U.S. Bureau of Labor Statistics.

^a Arithmetic average of monthly weighted average prices.

In the years 1921-31 the corn crop averaged about 2.7 billion bushels, about the same as the 5-year pre-war average. Four of the last ten crops have been below the pre-war average of 2.7 billion bushels, six above it. The average acreage in these ten years has been lower than the average acreage in the five pre-war years; but the average crop has been slightly larger.

Except for the large crop of 1921 and that of 1930 (both of which sold at exceptionally low prices), all of the

crops since the war show higher average dollar prices and larger gross dollar values than any of the pre-war crops. In average value, the last ten crops have been about 24 per cent above the five pre-war crops, which averaged about the same size. The returns for 1930-31 are very low.

The current dollar values ought, however, to be reduced to a common basis—that of the 1913 dollar.¹ When the adjusted values are examined, it is observed that in nine of the ten years since the war the value of the corn crop was less than the pre-war average. This inference is reinforced when it is realized that the corn crop since the war has been about the same size as the corn crop before the war. The adjusted gross values for the corn crop therefore support the interpretation that the gross values of the crop since the war have tended to a lower level than before the war.

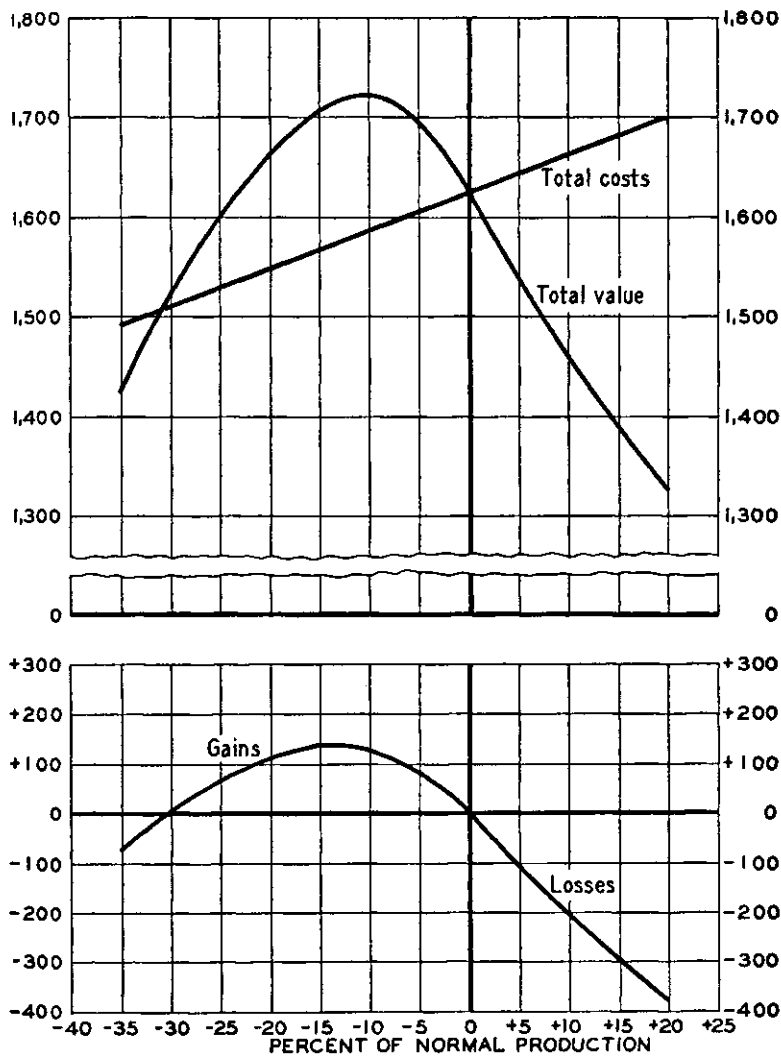
Important also is the relation of annual gross value to size of crop. We meet here the familiar statement that, in general, large crops tend to bring in less money than small crops. This is a subject of special importance in the corn belt. The statement that large crops tend to yield lower returns than small crops, properly qualified, holds true for corn and hogs. Peterson² has constructed a chart to illustrate for corn, among other crops, the relation of surpluses to net farm income. The graph, drawn to reproduce the relation of supply of corn to total farm value and costs of corn, illustrates strikingly that corn is a crop of which large production does not imply large value. According to the graph, with a normal acreage of corn, yields 10 per cent below normal would have the largest total value. In undertaking to measure the precision of the graph, which we have had copied in Chart 14, one

¹ It is fully recognized that to adjust a farm price with a wholesale price index number is a hazardous and misleading procedure.

² G. M. Peterson, "The Relation of Annual Weather Surpluses to Net Farm Incomes," *The Annals*, March 1929, CXLII, 391-401.

CHART 14.—RELATION OF SUPPLY OF CORN TO TOTAL FARM VALUE AND COSTS*

(Millions of 1913 dollars)



* Copied from Chart IV in G. M. Peterson, "The Relation of Annual Weather Surpluses to Net Farm Incomes," *The Annals*, March 1929, CXLII, 399.

would need to consider the methods by which prices and costs have been computed. Such a review is not necessary for the present purpose, since the broad import of the graph is in harmony with the facts at our disposal, and has been generally accepted by agricultural economists.

GROSS VALUE OF HOG CROP

Table 18 presents the values of the hog crops for the five years before the war and since 1922, by calendar years. Strictly speaking, the value of a hog crop ought to be computed for the year November 1—October 30; but this is not possible, since estimates of total slaughter are made only for the calendar year. In the computation of the values it is assumed that hogs slaughtered outside of federal inspection have had the same average weights as hogs slaughtered under federal inspection; also, that the farm prices of hogs sold for slaughter outside of federal inspection corresponded to the farm prices of hogs sold for slaughter under federal inspection. In addition, uncertainty is introduced into the computations by the fact that estimates of slaughter outside of federal inspection are based upon the use of an old ratio that is not to be regarded as trustworthy, but cannot be corrected (if then) until the data of the census of 1930 become available. But in view of the fact that the values of the corn crops are based on cash corn prices applicable to a relatively small proportion of the crop, while the values of the hog crops are based on estimates applicable to two-thirds of the crop, our approximations of the values of the hog crops are probably as good as the estimates of the values of the corn crops. The last column contains the values in 1913 (wholesale) dollars.

What first arrests attention is the striking post-war increase in the volume of annual slaughter. For the calendar years 1910-14 this appears to have averaged 11,922

TABLE 18.—HOG SLAUGHTER, FARM PRICE OF HOGS, AND HYPOTHETICAL VALUE OF HOG SLAUGHTER, 1910-14 AND 1922-30*

Year	Total estimated hog slaughter— Eye weight (million pounds)	Weighted average farm price of hogs (dollars per hundredweight)	Farm value of total slaughter (million dollars)	Adjusted farm value of slaughter (million dollars)
1910.....	10,626	8.10	861	853
1911.....	12,367	6.30	779	838
1912.....	11,986	6.66	798	806
1913.....	12,501	7.44	930	930
1914.....	12,129	7.52	912	930
Average.....	11,922	7.20	856	871
1922.....	15,388	8.32	1,280	860
1923.....	17,991	7.11	1,279	832
1924.....	17,703	7.46	1,321	882
1925.....	15,400	10.88	1,676	1,056
1926.....	15,462	11.75	1,817	1,203
1927.....	16,158	9.67	1,562	1,064
1928.....	17,560	8.60	1,510	1,024
1929.....	17,366	9.34	1,622	1,113
1930.....	16,274	8.78	1,429	1,097
Average.....	16,589	9.10	1,499	1,015

* Data supplied by the U.S. Department of Agriculture. Adjusted farm value obtained with the use of annual index numbers (on the 1913 base) of the U.S. Bureau of Labor Statistics.

million pounds; for the years 1922-30 it averaged 16,589 million pounds, an increase of about 39 per cent. The annual value for the five pre-war years averaged 856 million dollars, and for the nine years 1922-30 about 1,499 million dollars, an increase of about 75 per cent. The average price per hundred pounds increased from \$7.20 to \$9.10, or about 26 per cent. If, however, the post-war prices in Table 18 are adjusted by the annual all-commodity index numbers (on the 1913 base), the average price for the years 1922-30 was only \$6.16 per hundred-weight. This is in agreement with the conclusion arrived at for corn—that the monetary return has been less since

the war than before, on the average. The returns for 1931 are very low.

If one could assume that the operative plant of swine husbandry is no larger since than before the war, it might be suggested that the large figures for values of the hog crops since the war have represented something comparable with a capacity outturn. But it is not possible to regard the outturn since the war as an increased efficiency of outturn from an unexpanded plant. The situation is more complex than that, as is indicated by the ratio of swine slaughtered to estimated number of swine.¹

The current dollar values must again be reduced to a common basis—that of the 1913 dollar.² When the adjusted values are considered, it is observed that during 1922–24 the values of the hog crops were about the same as before the war, whereas since 1924 they have been substantially higher. But in the years 1922–24 the volume of slaughter was much greater than before the war; therefore, the relative farm value of the hog crop was less. The larger values for the years since 1924 should, of course, be adjusted also for the larger volume of slaughter, an adjustment not readily applied to the gross income.

A graph illustrating the relation of supply to total farm value and costs of hogs, comparable to that given for corn on page 259, has not been constructed so far as we are aware. Something approaching it in import, however, has been supplied in the estimates of Mordecai Ezekiel³ bearing on the relation of hogs slaughtered under federal inspection to hog prices in the terminal markets.

The chart of Ezekiel illustrating the relation of hog supplies to prices and values we have copied in Chart 15.

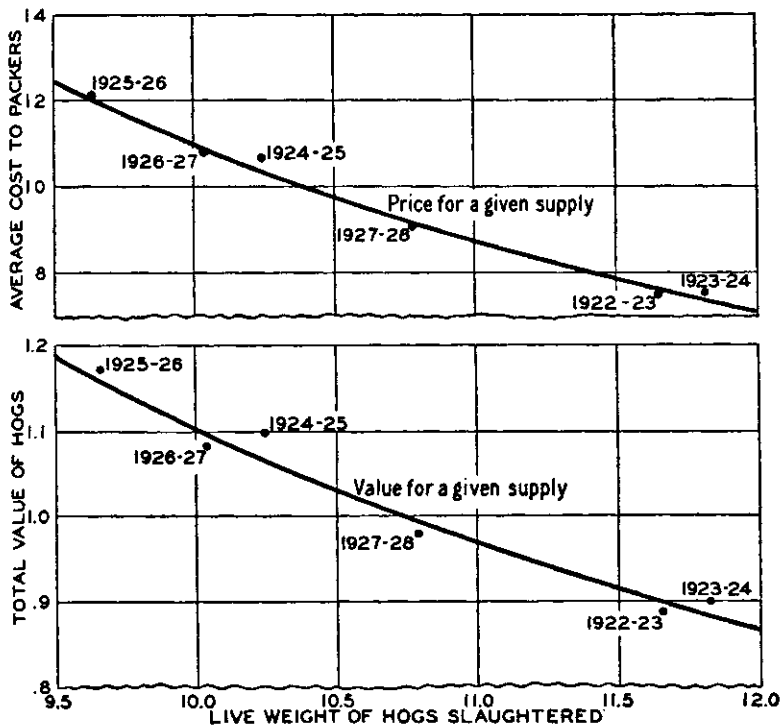
¹ See Appendix Table II.

² With the reservation expressed in footnote 1 on p. 258.

³ "A Statistical Examination of the Problem of Handling Annual Surpluses of Non-perishable Farm Products," *Journal of Farm Economics*, April 1929, XI, pp. 203–07.

CHART 15.—RELATION OF HOG SUPPLIES TO PRICES (ADJUSTED TO 1928 PRICE LEVEL) AND VALUES, NOVEMBER–OCTOBER, 1922–23 TO 1927–28*

(Dollars per 100 pounds; billion dollars; billion pounds)



* Copied from Figure 3, Mordecai Ezekiel, "A Statistical Examination of the Problem of Handling Annual Surpluses of Non-perishable Farm Products," *Journal of Farm Economics*, April 1929, XI, 204.

Within the limits of quantity of supply used in the chart, the curve illustrates clearly the inverse relation between live weight of hogs slaughtered and total value. J. D. Black,¹ employing a somewhat different approach, arrives

¹ *Agricultural Reform in the United States*, p. 126.

at the same conclusion. Thus, the best available statistical evaluation confirms for hogs, as for corn, the experience of the corn belt that the gross values of the annual outturn of corn and hogs have tended to decrease with the size of the crops.

The business depression through which the country is passing has been associated with a pronounced decline in farm income in the corn belt. Scarcely an instance is to be cited of maintenance of price of any farm product significant in the gross income of farmers in the corn belt. The prices of cattle, sheep, hogs, poultry and eggs, butter fat, wheat, corn, rye, barley, and oats have all been relatively low and for most of these products the prices have fallen heavily, in some instances to record low levels. The short corn crop of 1930 did not bring a relatively high price but served merely to moderate somewhat the decline in the price of corn. When the farm income for the state of Iowa is tabulated for 1931 (see Table 33, p. 514), it will quite certainly fall below the estimates for 1923, 1924, and 1930; it may indeed show an income approaching or corresponding with those of 1921 and 1922. However fully farmers may realize that this decline in gross income is not peculiar to the corn belt, this understanding brings little consolation; looking backward, farmers tend to feel that the work of the last decade has been in vain.

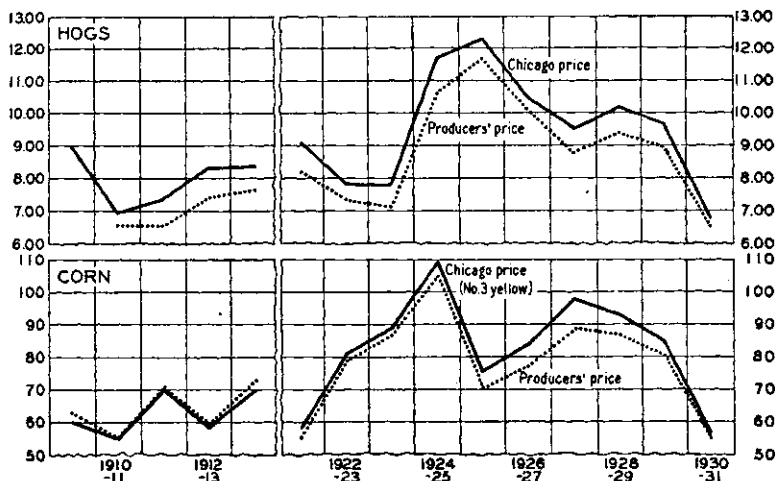
RELATIVE POSITION OF CORN AND HOG PRICES

Estimates of producers' prices of corn and hogs are less trustworthy than reported terminal prices. As against this, the post-war terminal prices are biased to the disadvantage of the farmers by the substantial increase in freight rates. The average estimated prices of corn and hogs received by producers (years beginning November 1) are contained in Chart 16. Instead of using the

weighted annual averages given in the *Agriculture Yearbooks*, we have used arithmetic averages of the monthly weighted average prices. This was done in order to have the annual figures all on the November-October crop-year basis.¹

CHART 16.—ANNUAL AVERAGE* PRICES OF CORN AND HOGS RECEIVED BY PRODUCERS AND AT CHICAGO, NOVEMBER-OCTOBER, 1909-14 AND 1921-31*

(Dollars per 100 pounds; cents per bushel)



* Based on data in Appendix Table XIII.

• The prices are annual arithmetic averages of the monthly weighted average prices.

Averaged, the producers' corn price since the war was about 122 per cent of the pre-war price; the producers' hog price since the war was about 126 per cent of the pre-war price, these without adjustment for changes in the dollar.

¹ Several reservations need to be made. Farm prices are based on reports of one day per month only. Quite certainly producers' corn prices in the corn belt would be different from the estimates for the entire country.

Chart 16 presents also the average annual prices at Chicago of No. 3 yellow corn and of hogs of all weights and grades.

Averaged, the terminal price of corn since the war was about 132 per cent of the pre-war price; the terminal price of hogs since the war was about 119 per cent of the pre-war price, these without adjustment for changes in the dollar.

What, now, have these prices represented in purchasing capacity?

The United States Department of Agriculture compiles index numbers of prices farmers pay for commodities purchased.¹ These indexes are based upon studies of farm life, and, though all goods and services cannot be taken account of, in these index numbers are included the prices of the principal things used in the household of the average farm family and in the operating procedures of the farm. These are weighted in accordance with reports based on annual purchases per average farm family, as revealed in surveys. In a sense, therefore, these index numbers may be used to represent the cost of living on the farm and the cost of working the farm. The ratio of the index number of prices received for farm products to the index number of prices paid for commodities purchased for the farm represents from year to year the power of a fixed quantity of stated farm products to purchase a fixed quantity of goods in relation to the base period. These numbers have been computed back to 1910, and the five years 1910-14 are therefore available as the base-line. These index numbers may be employed to test the purchasing power of corn and hogs since the war, using the years 1910-14 as a base-line.

¹ See also pp. 322-23. In view of the desirability and scarcity of consumption indexes, these farm index numbers are greatly to be welcomed. The index numbers of prices of articles used in the farm living and of articles used in farm operations ought to be revised frequently in order to take account of changes in the scale of living and in the implements employed in farming.

Table 19 contains the average producers' prices of corn, the index numbers of the prices of corn on the pre-war base, the farm household index numbers and the farm operative index numbers, and the ratios respectively of the corn index numbers to the farm household index numbers and the farm operative index numbers. These ratios tend to express year after year, from 1921 to 1930, inclusive, the purchasing power of corn in relation to the commodities included in the household index number and the operative index number. The table also contains the average producers' prices of hogs, the index numbers of the prices of hogs on the pre-war base, and the ratios respectively of the hog index numbers to the farm household index numbers and the farm operative index numbers. These ratios tend to express year after year from 1921 to 1930, inclusive, the purchasing power of hogs in relation to the commodities included in the household index number and the operative index number.¹

According to the ratios in item (E) of the table, the purchasing power of a bushel of corn for household articles used on the farm was below 80 per cent of the pre-war capacity in five of the ten years; in one year it was above par, 101.9 per cent; the average for the ten years was 77.0 per cent. According to the ratios in item (F), the purchasing power of the bushel of corn for operative articles used on the farm was below 80 per cent of the pre-war capacity in three of the ten years; in one year it was above par, 112.8 per cent; the average was 86.2 per cent. The figures suggest for the 10-year period a substantial reduction in the purchasing power of corn for the commodities stated, contrasted with the pre-war base-line. In other words, the cost of living and working

¹ A new index of agricultural purchasing power has recently been developed by M. D. Anderson ("An Agricultural Theory of Business Cycles," *The American Economic Review*, September 1931, XXI, 427), but it is not applicable to the examination here being undertaken.

TABLE 19.—FARM PURCHASING POWER OF CORN AND HOGS, 1921-30*

Item	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
(A) Index number of all commodities used in family maintenance (base: 1910-14 = 100)	165.4	159.5	161.4	161.5	165.3	164.1	160.9	162.0	160.0	151.0
(B) Index number of all commodities used in production (base: 1910-14 = 100) ..	141.8	140.4	141.6	142.8	149.4	144.3	143.7	146.0	146.0	140.0
(C) Weighted average corn price ^a received by producers (<i>cents per bushel</i>)	62.1	54.3	76.7	84.0	105.8	71.0	74.9	85.2	85.0	79.8
(D) Index number of corn price (base: 1909-14, 62.8 = 100)	98.9	86.5	122.1	133.8	168.5	113.1	119.3	135.7	135.4	127.1
(E) Relation of corn-price index number to that of all commodities used in family maintenance (<i>percentage</i>)	59.8	54.2	75.7	82.8	101.9	68.9	74.1	83.8	84.6	84.2
(F) Relation of corn-price index number to that of all commodities used in production (<i>percentage</i>)	69.7	61.6	86.2	93.7	112.8	78.4	83.0	92.9	92.7	90.8
(G) Weighted average hog price ^a received by producers (<i>dollars per 100 lbs.</i>) ..	8.52	8.10	7.34	7.06	10.46	11.63	10.21	8.67	9.27	8.93
(H) Index number of hog price (base: 1910-14, 7.01 = 100)	121.5	115.5	104.7	100.7	149.2	165.9	145.6	123.7	132.2	127.4
(I) Relation of hog-price index number to that of all commodities used in family maintenance (<i>percentage</i>)	73.5	72.4	64.9	62.4	90.3	101.1	90.5	76.4	82.6	84.4
(J) Relation of hog-price index number to that of all commodities used in production (<i>percentage</i>)	85.7	82.3	73.9	70.5	99.9	115.0	101.3	84.7	90.5	91.0

* Data from *Agriculture Yearbooks*, 1930, p. 853, and 1931, pp. 625 and 1022; and Bureau of Agricultural Economics, U.S. Department of Agriculture, *Index Numbers of Prices Farmers Pay for Commodities Purchased* (mimeographed), August 1928, pp. 3 and 5.

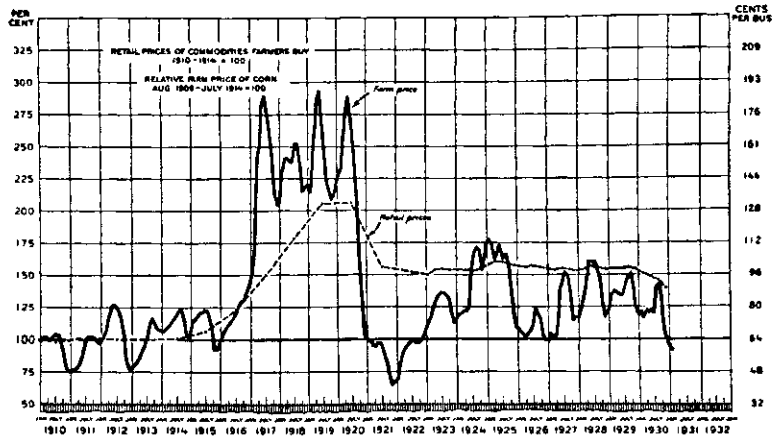
^a The prices of corn and hogs are for years beginning November 1; i.e., the price given for 1921 is for the year November 1920-October 1921. The index numbers in Items (A) and (B) are for calendar years. This overlapping of two months can make no sensible difference in a series.

on the farm has been relatively higher than the farm price of corn, compared with the pre-war capacity.

According to the ratios in item (I), the purchasing power of the hundredweight of hogs for household goods was below 80 per cent compared with the pre-war capacity in five of the ten years; it reached par in only one year, when it was 101.1; the average was 79.9 per cent. According to the ratios in item (J), the purchasing power of the hundredweight of hogs for operative articles was below 80 per cent of the pre-war capacity in two of the ten years; in three years it approached or surpassed par; the average was 89.5 per cent. The depreciation of purchasing power was less pronounced for hogs than for corn; over the period the effective prices of hogs stood relatively higher than the effective prices of corn.

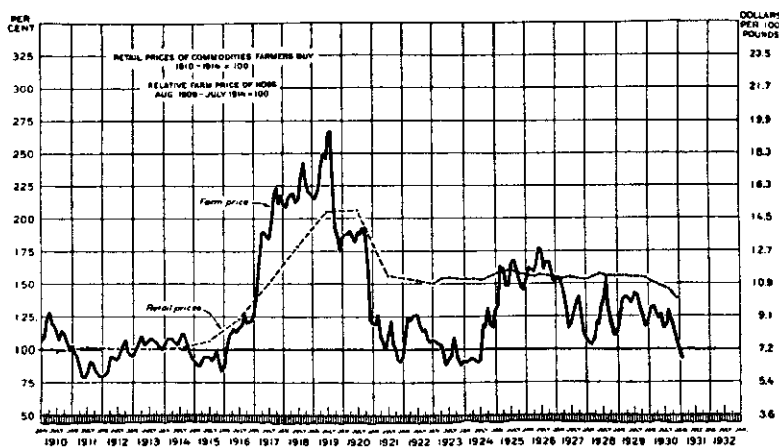
The relations of farm prices of corn and hogs to the indexes of retail prices of commodities farmers buy are shown graphically in Charts 17 and 18. Even with allow-

CHART 17.—FARM PRICES OF CORN AND INDEX OF RETAIL PRICES OF COMMODITIES FARMERS BUY, 1910-31*



* This chart was furnished to us through the courtesy of the Bureau of Agricultural Economics of the U.S. Department of Agriculture.

CHART 18.—FARM PRICES OF HOGS AND INDEX OF RETAIL PRICES OF COMMODITIES FARMERS BUY, 1910-31*



* This chart was furnished to us through the courtesy of the Bureau of Agricultural Economics of the U.S. Department of Agriculture.

ance for the approximations included in the data from which these charts are constructed, the disparities between selling prices and buying prices are well shown.

We are not disposed to plead that these comparisons represent exactly, or even approximately, the positions of the prices over the interval, but the disparity is striking. These index numbers indicate a substantial reduction of the purchasing power of corn and hogs during the past decade compared with the pre-war base-line, a reduction more pronounced for cash corn than for hogs.

The simplest method of contrasting pre-war and post-war terminal prices of corn and hogs is with the use of the all-commodity wholesale-price index number. In this manner it is possible to indicate (approximately but without precision or too far-reaching implications) the relative positions occupied by the prices of corn and hogs annually since the war. The data are contained in Table 20.

Item	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
(A) Average wholesale-price index number of all commodities (base: 1910-14 = 100)	150	152	156	152	162	154	149	153	151	135
(B) Weighted average price of No. 3 yellow corn at Chicago ^a (cents per bushel)	62	55	73	88	106	75	87	101	92	83
(C) Index number of corn price (base: 1909-14, 61 = 100)	102	90	120	144	174	123	143	166	151	136
(D) Relation of corn-price index number to all - commodity wholesale-price index number (percentage)	68	59	77	95	107	80	96	108	100	101
(E) Weighted average price of hogs at Chicago (dollars per 100 lbs.)	8.51	9.22	7.55	8.11	11.81	12.34	9.95	9.22	10.16	9.47
(F) Index number of hog price (base: 1910-14, 7.96 = 100)	107	116	95	102	148	155	125	116	128	119
(G) Relation of hog-price index number to all - commodity wholesale-price index number (percentage)	71	76	61	67	91	101	84	76	85	88

^a Data from *Agriculture Yearbooks, 1928*, p. 930, and *1931*, pp. 626 and 1022.

^a The prices of corn are for years beginning November 1; i. e., the price given for 1921 is for the year November 1920—October 1921.

It is apparent that the prices of corn and hogs have been out of line downward in most of the years since 1921. For corn, the index was higher than the all-commodity wholesale-price index number in three years (1925, 1928, and 1930), equal to it in 1929, below it in the other six years, of which all but two were much below. For hogs, the index was above the all-commodity wholesale-price index number in one year (1926), below it in the other nine years, and much below it in five of these. Using arithmetic means over the period, corn stood at 135 compared with the all-commodity wholesale-price index number of about 151; hogs stood at 121 compared with 151. The wholesale corn and hog prices, like the gross values for the corn and hog crops, have therefore to be interpreted to the effect that the prices of corn and hogs have been relatively low most of the time since the war.¹

It is interesting to compare the ratios of terminal prices with those of farm prices. In Table 21 are brought together the ratios from Tables 19 and 20. The terminal corn ratios are consistently higher than the farm household ratios, but above the farm operative ratio in only six out of the ten years. The terminal hog ratios were higher than the farm household ratios in only five years; in three years the ratios were almost identical, but in the years 1921, 1923, and 1927 the terminal hog ratio was lower than either of the farm ratios, and in every year it was below the operative ratio. Evidently, the same

¹ On account of higher freight rates, the terminal prices appear more favorable to farmers than they are in fact. It is to be kept in mind that the general index numbers of the United States Bureau of Labor Statistics and the special index numbers of the Department of Agriculture are not strictly comparable, and, therefore, the comparisons above are to be interpreted with this qualification. Also, the recent revision of the wholesale index number of the Bureau of Labor Statistics has different weightings from those employed in the one adopted in 1926. It would perhaps best be bluntly acknowledged that all comparisons between pre-war and post-war index numbers are more or less unsatisfactory. Tables 19, 20, and 21 are to be used with strict reservations in respect to comparability.

TABLE 21.—PURCHASING POWER OF CORN AND HOGS, BASED ON PRICES RECEIVED BY PRODUCERS AND THOSE IN CHICAGO, 1921-30*
(Percentage)

Item	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
Purchasing power of corn at Chicago for all commodities	68	59	77	95	107	80	96	108	100	101
Farm purchasing power of corn for commodities used in family maintenance.	60	54	76	83	102	69	74	84	85	84
Farm purchasing power of corn for commodities used in production	70	62	86	94	113	78	83	93	93	91
Purchasing power of hogs at Chicago for all commodities	71	76	61	67	91	101	84	76	85	88
Farm purchasing power of hogs for commodities used in family maintenance.	74	72	65	62	90	101	91	76	83	84
Farm purchasing power of hogs for commodities used in production	86	82	74	71	100	115	101	85	91	91

* Data from Tables 19 and 20.

major forces have been operative in all these ratios, but the effects were less completely realized in one or the other direction in different years.

The argument may be extended internationally, though the relevant statistical data are not in hand. It will, however, not be disputed that agricultural producers the world over are receiving for their products prices which are low both absolutely and relatively. This finds direct expression in the purchasing capacities of these classes. The reduced purchasing capacity of the agricultural class in each country is first evinced in a decline in purchase of goods of domestic manufacture. But very soon becomes apparent the next effect, namely, reduction in purchase of imported goods. In consequence, the earnings of international shipping decline. Unemployment arises in the countries actively manufacturing for export. In consequence of reduced exports, these countries import less from the outlying agricultural countries. This vicious circle is now clearly apparent in the disequilibrium between exporting and importing countries. Viewed in this broad sense, the disparity between producers' prices of agricultural products and the prices of the goods they buy, taken in connection with the heavy decline in the price level of raw materials, constitutes a fact of the first order in the depressed business situation of the world.

CHANGE IN THE VALUE OF GOLD

Adjustments were made above to 1913 dollars; for this we must now give the explanation. One qualification must be inserted in all discussions on prices of farm products—namely, the effect of the fluctuating value of money.¹ The

¹ For a popular statement see J. R. Commons, "Farm Prices and the Value of Gold," *The North American Review*, January 1928, CCXXV, 27-41, and February 1928, CCXXV, 197-211. See also Irving Fisher, *The Money Illusion* (New York, Adelphi Company, 1928), and E. P. Gay, "The Gold Problem," *Foreign Affairs*, January 1931, IX, 195-203. A somewhat divergent but highly significant position is set forth in J. M. Keynes, *A Treatise on Money* (London, Harcourt, Brace & Company, 1930).

unit, the measure, of values of goods and services—the gold dollar—has itself a varying value. Money, which includes gold, currency, and all forms of credit, fluctuates in value both in short-time movements and in long-time secular trends. The value of gold may vary as much as or more than the value of goods; and different goods vary widely in fluctuations in exchange value for gold. With the value of money constant, or adjusted for purposes of comparison, corn and hogs fluctuate in amounts and consequently in exchange value; with corn and hogs constant, money may fluctuate in amount and consequently in exchange value. Those goods tending to fluctuate most in amounts are naturally most exposed to price fluctuations. The influences which bring changes in the general price level may affect the price of one material to a disproportionate extent. Thus the price of one material may proceed *pari passu* with movement in the general price level or may anticipate or lag behind it and may be greater or less in amplitude, expressive of greater or lesser sensitiveness to price change.

In looking backward on gold values and commodity prices, particularly with the view of establishing a baseline of price level for farm products, several facts stand out. (1) In 1879 the country returned to the gold standard, following which prices declined. (2) Around 1895-96 occurred a definite turn (upward) in secular trend of prices. (3) The year 1913-14 or the period 1909-14, is commonly regarded as the best available pre-war baseline, partly for statistical reasons but largely because it has been the marking point for subsequent disturbances. Gold had a relatively low value. (4) The year 1920 marked the peak of inflation in the world; prices fell sharply during the following two years. (5) The year 1923 marked the world-wide recession of deflation and most of the new index numbers used in the world are based on prices in different countries dating from 1923

to 1926.¹ (6) Beginning in 1927 (more accurately in 1925 for some countries and some commodities), ensued a progressive world-wide decline in the price level, particularly marked for the raw materials, the products of agriculture, mining, and forestry. This decline in general price level has brought prices down to or below the pre-war base-line. The wholesale-price index number of *The Economist*, which is heavily weighted with raw materials, touched the pre-war level in December 1930. The wholesale-price index number of farm products of the United States Bureau of Labor Statistics stood in December 1930 at 113.6 (1913 = 100); in June 1931 it stood at 98.8; and in September 1931 it stood at 91.4. (7) The price-level declines in 1920-22 and 1929-31 are not to be regarded as identical in nature or causation or as comparable in duration and implications. (8) Contrasting the prices of corn and hogs before and after the World War, one observes that the purchasing capacities of corn and hogs have exhibited an upward trend since the close of the Civil War, especially marked from 1900 to 1914. Since the World War the purchasing capacities of corn and hogs have been heavily reduced.

For purposes of study of agricultural prices, the years immediately preceding the outbreak of the war furnish the best available base-line. The all-commodity wholesale-price index number was established on the 1913 base-line and, although it has been computed backward, the farther back one goes, the less trustworthy becomes the index on account of diminishing comparability of prices. The industry of the country just before the war was fairly but not exactly comparable, in trend and development if not in mass, with our post-war industry. Agricultural prices were relatively high just before the war and give

¹ The all-commodity wholesale-price index number of the Bureau of Labor Statistics is based on the prices of 1926. The index number of 1926 on the 1913 base is 151. A differently weighted index number has recently been introduced.

a somewhat higher position to agriculture than that obtained from the prices of the 'nineties; but with due appreciation of the advancing standard of living no significant bias is thereby introduced. The base-line of agricultural prices must, however, represent an average of not less than five years, in order to allow for crop variations. It is best to compare agricultural prices with all-commodity wholesale-price index numbers for 5-year periods, but probably no serious bias or error is introduced in comparing the average of 5-year agricultural prices with the all-commodity wholesale-price index number for 1913. Current prices of urban goods and services may be compared with prices in 1926 or 1913, depending on the purpose of the inquiry; but agricultural prices are to be compared with those of 1909-14, since 1926 (or any single year) or even 1923-26 would offer too tenuous and biased a base-line.

The value of money, which had been falling since 1896, declined heavily after 1914, until the summer of 1920. Conversely stated, the price level rose. If one uses the all-commodity wholesale-price index number as corresponding to a general index number (which it does not), the value of money was so low in May 1920 that it required almost 2.5 times as much money as in 1913 to buy the unit of goods; i.e., the price index number was 247. Thereafter, the value of money rose, with several recessions. During the course of the year 1931, the price level of raw materials as a group has fallen to the 1913 level; that is, for the purchase of raw materials, the purchasing power of money has risen to 100. The war and post-war inflation had reduced the purchasing power of money to less than half the 1913 value; the subsequent deflation has restored the purchasing power of money beyond the 1913 level.¹

¹ With respect to the cause of the recent decline in price level, it is too early to speak. Quite generally, the price decline of 1929-31 is regarded as the

To repeat, prices of goods rise and fall not merely in response to changes in volumes of goods, in accordance with equation between supply and demand, but also in response to changes in volume and use of money. Under certain circumstances, changes in volumes of goods are the more important in effecting changes (especially short-time) in prices of goods; but under other circumstances, monetary changes are more important than changes in volumes of goods. Progressive improvements in technique tend to lower prices as expression of lowered costs. Along some lines, it might be reasonably possible, within limits, to control the volumes of goods; under such circumstances, changes in prices of goods would be restricted approximately to changes in money. But along other lines, volumes of production cannot be controlled at all, or only slightly; under these circumstances, the prices of the commodities in question are bilaterally subject to modification by changes in volumes of goods and changes in volume and use of money. The wide swings in general price level are likely to be due to monetary influences, not to relations of production of goods.

Now, agriculture for the most part may be clearly classed as an occupation in which production is relatively least controllable. Plant husbandmen can control acre-

downturn of a trade cycle. Recognizing the cyclical nature of the price deflation, in certain quarters it is felt that there is also a secular element present, the expression of shortage of gold. Further, a new factor has been added, namely, inequitable distribution of gold and inequitable use of gold by central banks in different countries. To the extent that the price decline has been cyclical, the price level will rise with the upswing of the cycle. But to the extent that the decline has been secular, due to shortage of gold, the low price level will persist; it may indeed be later accentuated if the prevalent acceptance of an impending gold shortage due to exhaustion of South African gold mines comes true. Time will tell. Cf. also M. D. Anderson, "An Agricultural Theory of Business Cycles," *The American Economic Review*, September 1931, XXI, 427. The recent declines in commodity prices find perhaps an additional explanation as a secondary effect of decline in prices of securities. In this sense it has been suggested that distressed (liquidative) selling of securities (and presumably of land also) has the effect of deflation and thus depresses the price level of commodities, like contraction of money and credit.

age, soil preparation, seed selection, use of fertilizer, and cultivation; but they cannot control rainfall, temperature, wind or hail, and pests only in part. With the unit of farm effort constant, in any year the yield per acre may rise or fall a tenth or a fourth of the average; occasionally the 10-year average may be almost doubled or halved in a particular season. Animal husbandmen can control breeding and the weight to which they finish animals; but they cannot control their feedstuffs correspondingly (and feel they must use them up) and are sometimes unable to control infectious diseases. In the corn belt, the outturn of hogs is inherently more controllable than is the outturn of corn; but the average farmer loses the advantage of this position because he is inclined to shift the plane of his hog breeding on the basis of the corn crop.

The farmer exchanges crops for money (in convertible currency) and with it buys other goods, hires labor, pays taxes and interest, and makes improvements. The one-crop farmer is obviously in a more hazardous position in exchanging his crop for money than is the farmer engaged in diversified agriculture, though occasionally the situation works out to the advantage of the one-crop farmer.

In the long run, agriculture tends to adjust itself to changes in the value of money, but the short-time experiences are often injurious to the point of disaster. During inflation, the farmer may gain at the expense of his creditors; during deflation, his creditors gain at the expense of the farmer. During inflation, the farmers may gain at the expense of consumers; during deflation, consumers gain at the expense of farmers. The gains of some farmers do not counterbalance the losses of others. The farmer who bought land in 1912-13, when corn was worth 57 cents a bushel, and paid the mortgage on that land in 1919-20, when corn was worth 152 cents a bushel, exchanged his labor (via corn) for land very advanta-

geously. But the farmer who borrowed in 1919 to buy corn land at an inflated price per acre will find it very difficult to pay for this land when the price of corn is under a dollar a bushel. The disadvantageous position of the second farmer cannot be balanced against the advantageous position of the first farmer; one cannot balance the fortunate farmers who retired with a competence in 1919-20 against the bankrupt farmers who have been foreclosed from the same lands following deflation of prices. In short, with inflation, the debtor class profits, with deflation the creditor class profits—circumstances that are highly important for agriculture.

The fixed charges of the farmer are rigid, in contrast with fluctuations in value of gold and value of goods. The mortgage covers a loan of fixed amount in dollars at a stated rate of interest. The sum of the loan and the rate of interest are not modified by the value of money or the current rate of interest, except as the lender may be induced to refund the debt at a lower capital figure or reduce the rate of interest. Taxes, also, are for the most part relatively fixed. The tax on land is the product of rate and assessment. If the rate were constant, when assessment fell with decline in land value, taxes would fall. But the charges for which taxes are levied show little tendency to fall. Therefore, with declining assessment, the rate must often be elevated. In effect, therefore, the farmer pays interest and taxes as relatively fixed charges, with products whose exchange value for gold may rise and fall.¹

Whatever changes in the value of dollars may develop during the next decade, these will exert an influence on

¹ As illustration, with yields of corn per acre constant, the farmer who in 1920 paid interest of \$600 with 400 bushels of corn paid the same interest in 1926 with 800 bushels of corn—he worked twice as many acres to pay his interest in 1926 as in 1920. The illustration is extreme, but a 10-20 per cent shift would represent a heavy burden.

the profit-and-loss account of farmers in the corn belt, both as operators and as landowners. The secular trend, cyclical changes, and the short-time fluctuations, have all an obvious influence on the purchasing power of corn and hogs and must be considered in any presentation of the state of agriculture in the corn belt. The price discussions in the various chapters of this treatise are all subject to these qualifications.

COST OF RAISING CORN AND HOGS

For every commodity the producers' selling price needs to be contrasted with cost of production. The prices of corn and hogs are recognized as difficult of appraisal; the costs of raising corn and hogs are still more difficult of adjudgment. There is no purpose in extending the inquiry to the period before the war. In the article on "The Corn Crop" in the 1921 *Yearbook* of the United States Department of Agriculture (p. 194), a figure for cost of production of corn in selected counties of Iowa was set at 53 cents. The costs varied widely with topography, yield per acre, and method of husking. No bulk-line of cost was suggested.¹

The Department of Agriculture now issues annually a figure for average cost of producing corn, based on a questionnaire filled out by voluntary reporters, to the number of nearly 5,000, in various parts of the country. Since it has been found that reporters tend to take most interest in filling out the questionnaires on crops in which they specialize, more reports on cost of raising corn come in from the corn belt than from the outlying regions. It is found that the corn yields per acre on the farms reporting costs are generally higher than the average yields estimated by the Division of Crop Estimates, which sug-

¹ Cf. statement in H. A. Wallace and E. N. Bressman, *Corn and Corn Growing*, pp. 272-78.

gests that these reports come from better-than-average farmers and the costs therefore are probably below the average. These figures for cost of raising corn may be compared with the Department's figures for producers' prices. The data are as follows, in cents per bushel:

Year ^a	Net cost of production ^b	Producers' price ^c
1922	66	76.7
1923	68	84.0
1924	82	105.8
1925	69	71.0
1926	70	74.9
1927	70	85.2
1928	73	85.0
1929	73	79.8
1930	89	54.9 ^d

^a The figures for cost of production are for the crop of the year indicated; those for price are for the year beginning November 1, i. e., the producers' price for 1922 is for the year November 1922 to October 1923.

^b *Crops and Markets*, June 1928, VI, 197, and June 1931, VIII, 233.

^c *Agriculture Yearbook*, 1931. p. 625.

^d Arithmetic average of monthly weighted average prices.

According to the questionnaire, the cost figure includes a charge for labor and a charge for use of land on a cash-rental basis. Presumably, the charge for the use of land on the cash-rental basis would not vary widely from the level of prudent rate of interest on the investment. Farm debt was not taken into account. If the cost of raising corn equaled the farm price, the labor of the farmer and interest on his investment were covered, but without reward to the grower as entrepreneur. If the cost figure stood above the farm price, the labor of the farmer, or his investment, was inadequately paid; if the farm price stood above the cost price, there was a reward for the grower as entrepreneur.

According to the data, in every year during 1922-29 the estimated producers' price stood above the estimated cost of production, in two years by less than 5 cents, but

in five years by more than 10 cents per bushel. Over the 8-year period, the average estimated producers' price stood over the average estimated cost of production by about 11 cents per bushel. For the 1930 crop, of which the cost was high because the yield was low, the producers' price was substantially lower than the cost of production. For the crop of 1931, it is already probable that the price will fall far below the cost.

The difficulty in applying these figures to the corn belt lies in the implied assumption that the five-sixths of the crop fed to animals yields ultimately the same return as the one-sixth of the crop sold for cash. This of course is not the case. In some years the price of hogs has returned to the farmer more than the figure for cost of corn and more than the figure for producers' price; in other years, less. It would require an intricate and rather hypothetical calculation to indicate how far the returns on corn fed to animals varied from the level suggested by a comparison of cost of production and producers' prices in the table above.

The United States Tariff Commission in 1928 issued a preliminary report of an investigation of the cost of raising corn, conducted under the provisions of Section 315 of the Tariff Act. The survey included 193 counties in eight states of the corn belt, in which region were planted, in 1926, 21 million acres of corn, yielding 616 million bushels. The counties were all surplus-producing areas, selected with the assistance of specialists in the states concerned and regarded as representative. The data on farm costs were obtained for 386 farms in the 193 counties involved. Presumably, the individual farms were selected as representative in soil, climate, and management. The study was conducted with unusual attention to detail; this advantage must be balanced against the small number of farms investigated. For the 1926 crop, the weighted average net cost of corn delivered (shrunk) to elevators

(with interest on land and other capital) was 75.2 cents. The highest cost was reported in Kansas, 133.0 cents, and the lowest cost in Illinois, 67.3 cents. For the 1927 crop the weighted average cost was 77.9 cents; the highest cost was 106.3 cents in Kansas, and the lowest cost was 72.8 in Nebraska. The figures are higher than those of the Department of Agriculture. Apparently the production cost of Argentine corn is less than 40 cents a bushel.

In the 1922 *Yearbook* of the United States Department of Agriculture, the cost of production of hogs was given a detailed consideration on the basis of data collected for 1921 in Iowa and Illinois. It was found that the range of cost of production of 100 pounds varied from \$3.76 to \$11.56. The variations were mostly due to size of litter, mortality in litter before weaning, mortality in the breeding herd, cost of feed, management, and type of hogs. The average (for 1921) was given as \$6.08 per 100 pounds of marketable hogs, for a year in which corn was relatively cheap. The weighted average hog price received by producers in the country for the year 1921 was \$7.81 per hundredweight; the average Chicago price for the year 1921 was \$8.51.

A volunteer organization, called the "Corn Belt Committee," in 1926 reported on the cost of production of corn and hogs in several of the Central States.¹ Their procedure was founded on the use of census data, and to each average farmer was assigned his proportion of the acreage in the state, classified according to uses. Each average farmer was presumed to possess his share of improvements, equipment, and animals and to pay his share of costs; he was presumed to receive his share of plant and animal crops and to sell his proportion of plant and animal products; he was assumed to carry his share of farm indebtedness. With these census data in hand, the values

¹ Issued in mimeographed form.

received for the several plant and animal crops were set against the several items of cost and maintenance in the accounting. With the charges of the farmer as landowner regarded as constant (5 per cent on investment in real estate and 7 per cent on investment in personal property), following subtraction of these from the gross returns a figure was secured for what the farmer was held to receive as operator. Conversely, regarding a set labor charge of the operating farmer as constant (\$1,800 per year for management and labor), following subtraction of this from the gross returns, a figure was secured for what was held to be left to the farmer as landowner. When both items were thus allowed, the results gave startlingly high figures for cost of production of corn and hogs. In Iowa, for example, the cost of production of corn was stated to be \$1.42 a bushel; the cost of hogs was given as \$16.32 per hundredweight (ratio 11.5:1).¹ No bulk-line of cost was suggested.

The Corn Belt Committee evidently regarded interest on the going value of land not as an anticipation but as a right, and put it down as an item of cost. The set figure employed for owner's wage, termed operator's salary, which was set for the family at \$1,800 per year (for a 160-acre farm), included use of farm dwelling and food-stuffs raised on the farm. Hired labor was allowed at the

¹A singular procedure stood out in that there was no income stated as derived from the sale of beef cattle. The average Iowa farmer was presumed to sell annually 47 hogs, 6 calves, 3 clips of wool, 3 lambs, and 300 chickens, 17,556 pounds of milk (2,926 pounds per cow per year), and 724 dozen eggs. But no mention was made of beef cattle. Yet the state of about a million farm inhabitants contains about 4 million cattle, of which only about a third are milch cows. In 1926 public stockyards outside of Iowa received from that state over a million and a half cattle, and over half a million feeders are annually shipped into the state, while many cattle are slaughtered there under federal and local inspection. In the years 1921-30, cattle (not including butter) and calves contributed about 22 per cent to the gross income of Iowa farmers, according to the estimates of the Iowa Agricultural Experimental Station. Cf. Knute Bjorka, *Income of Iowa Agriculture* (Iowa State College Agricultural Experiment Station Circular 104), June 1927, p. 5; also Table 33, p. 514 below.

rate of \$50 a month and \$15 board for one man for six months. Combined in this estimate of so-called operating costs by the Corn Belt Committee was, therefore, a return on speculation, interest on the factual investment account, and an insured rate of return on the labor account. According to this method of estimating costs (including labor, subsistence, and investment accounts) in Iowa, the operative loss per farm was given as around \$2,603, and the average out-of-pocket operating loss as around \$1,585 per farm.

The estimates of average production costs and returns in the corn belt, thus arrived at by the Corn Belt Committee, have not been given serious attention in farm circles, because they obviously implied a degree and extent of insolvency in farming in the corn belt that was repugnant to the common sense of the farmers of that region. But the estimates are particularly significant in illustrating the accounting when a speculative figure for value of land is regarded as earning capital in the investment.

Possibly the figures of the Department of Agriculture on costs of production of corn and hogs are somewhat too low to be representative of the corn belt and may not apply to other regions. Also, they give no information as to pre-war status and changes since the war. On the other hand, there is no question that the cost figures of the Corn Belt Committee are beyond reason. If the verifiable costs of production of corn and hogs in the valleys of the Ohio, Mississippi, and the Missouri are anywhere near as high as the figures issued by the Corn Belt Committee, the American farm cost of hogs exceeds the post-war average price of American lard in Europe since the war.

The outstanding difficulties in interpreting fragmentary data on production costs of corn and hogs lie in the plus-and-minus errors in the individual items and in the wide range of cost levels revealed in surveys. Differences

in land and rainfall, variations in climate within the season, the previous state of the soil, the strains of corn and hogs employed, differences in implements and in practices—these and other factors result in a range of estimates in which the figures in the upper third are over twice as large as those in the lower third. One does not get away from the real difficulty by trying to set up a bulk-line, nor by attempting to secure weighted figures. What are really desired are the costs of production of representative farmers on representative land. From this point of view, the data in a relatively small series of selected farms, concordantly assembled, are most to be relied on.

Surveying the several items in cost of operation, it seems clear that average costs must have increased since the war. The index number of farm labor stood until 1930 at around 170 (1910-14 = 100). For 1930 the index number was 152, but in January 1931 it declined to 129 and in October to 113. It is known that prices of equipment and building materials as a class have been relatively high. All in all, operative costs must have risen since the war by something more than the change in the value of money. As against this must be set possible increases in efficiency.

The cost of raising corn has been substantially reduced for growers who, singly or in co-operation, have an acreage large enough to warrant the purchase of up-to-date machinery. With the use of the tractor, it has become possible to plow deep, plant rapidly, cultivate early with the modern rotary hoe and later with the four-row cultivator, and harvest with the two-row husker, with a heavy saving of labor. Under favorable conditions, possibly the saving may be as much as 15 cents a bushel after amortization of the capital invested in the machinery. As against the direct advantages stands the indirect disadvantage of loss

of demand for corn involved in substitution of tractors for horses.¹

There are some savings in mass production of hogs, but less than in the case of corn. With the best of installations one man can care for more hogs than he could before the war. If all farmers had modern equipment, the increase in efficiency might overbalance the increase in cost. Unfortunately, only a small proportion of the farmers enjoy the new facilities, whereas most of them carry the heavier costs. We take it, therefore, that since the war the average cost of raising corn and hogs has increased, but by what margin cannot be even approximately stated.

BURDEN OF TRANSPORTATION EXPENSE

Among the changes (significant for the corn belt) brought about by the war was the elevation of rates for shipment of corn, cattle, and hogs over railways. The largest factors in costs finding expression in railway rates are wages and taxes. There is widespread belief that horizontal increases in freight rates have imposed a disproportionate burden on raw materials as against finished goods. This was the background of the Hoch-Smith Resolution. While the current rates on farm products, directly appraised, in themselves may not be regarded as excessive or exploitive or as contributing to more than a fair payment for service rendered, nevertheless the freight on corn and hogs constitutes a larger item in, and proportion of, the spread between farm and terminal prices of corn and hogs than was the case before the war.²

¹ Cf. W. I. King, "Farm Income and the Gas Engine," *Wallaces' Farmer*, January 11, 1929, pp. 5 and 15.

² Cf. *The Condition of Agriculture in the United States and Measures for Its Improvement: A Report by the Business Men's Commission on Agriculture* (New York and Washington, 1927), pp. 83-88; J. D. Black, *Agricultural Reform in the United States*, pp. 419-35; and Bureau of Railway Economics, *Commodity Prices in Their Relation to Transportation Costs*, Bulletin No. 25, *Corn*, December 1927, and Bulletin No. 33, *Livestock*, June 1930.

Farm leaders in the corn belt have been in no position to enter into an analysis of the government operation of railways during the war. At the same time, it is gradually coming to be believed that the policy of low rates adopted during the war (as also of low interest rates) was one of ultimate injury to agriculture. During government operation, the physical properties of the carriers were neglected; since the war the extensive betterments necessary to rehabilitate the railways and bring service to the plane demanded by shippers were accomplished at relatively high cost. With the rate base employed, this seems inevitably to have imposed a disproportionate burden on agriculture. Certainly, the method of raising freight rates by horizontal elevation was particularly hard on agriculture, following the deflation of prices in 1920-21, on account of low value, heavy bulk, and long haul of farm products. The index number of freight rates on farm products apparently stood in 1930 around 150; this was much higher than the all-commodity wholesale-price index number, and very much higher than the index number of prices of agricultural products. Farm leaders suspect that a weighted index number of freight rates on farm products would reveal a situation still more disadvantageous to agriculture and high freight rates are regarded as particularly burdensome on export of farm products. Farmers are convinced that increase in special classes of freight rates, on the basis of larger consideration of value in the case of finished goods (many of which are semi-essentials or luxuries), would permit the carriers to reduce rates on agricultural staples and still leave their net revenues unimpaired. Broad questions of policies and practicalities are intertwined; but throughout the controversies over freight rates before the Interstate Commerce Commission, the important fact stands out clearly that manufacturers and shippers of finished goods occupy a strategic position in freight-rate hearings, all the more because railway traf-

fic officials often side with them (in effect, against the shareholders of the companies), out of regional considerations. Farmers in the corn belt recognize that diversion of transcontinental commerce through the Panama Canal has injured the granger roads as well as Midwestern industries; and farm support of the Great Lakes-St. Lawrence waterway is based on the view that this would prove advantageous to Midwestern industries, granger roads, and agricultural producers.

Rail rates on corn and hogs were first raised in June 1918, again for corn in December 1919, and finally for both corn and hogs in August 1920. They were reduced to a moderated level in January 1922, and somewhat modified in 1931.

So far as we are aware, no weighted figure for the post-war increase in freight rates on corn and hogs has ever been prepared. From the records of the carriers the freight rates from every shipping point in the corn belt could be weighted with the volume and distance of shipment in carload lots and thus for each crop year a figure would be secured representing approximately the weighted cost of shipment of the corn and hogs of that crop passing over rails. Whether the usefulness of such figures would justify the labor is perhaps doubtful. Illustrations from chosen points would probably be quite as useful.

For purpose of illustration, it will here suffice to quote the freight rates from Marshalltown, Iowa, to Chicago, with service by three railroads. Before the war, indeed up to 1918, the freight rate on corn was 11.5 cents and on hogs 21 cents per hundred pounds. The freight rate in effect from 1922 to 1931 was 17.5 cents per hundred pounds of corn and 32.5 cents per hundred pounds of hogs. This corresponded to an increase over the pre-war rate of 3.4 cents per bushel of corn and 11.5 cents per hundred-weight of hogs. The index for corn is 152 and for hogs

155. The distance from Marshalltown to Chicago is 290 miles.

It seems probable that the average bushel of corn received in the eleven principal terminal markets does not travel as far as the distance from Marshalltown to Chicago. Considering the location of packing houses at St. Paul, Sioux City, Omaha, Kansas City, St. Louis, Indianapolis, and Chicago, it seems probable that the average hog received in the packing-house centers does not travel as far as from Marshalltown to Chicago. If one could assume (which is not suggested) that the freight increases from Marshalltown to Chicago may be taken as illustrative of the corn belt, the extent of the added burden laid on the prices of corn and hogs by the horizontal increase in freight rates would be indicated. If the farm price of corn were 70 cents, 3.4 cents per bushel would represent 5 per cent; this would rise and fall with the farm price of corn. The increase in freight rate would amount to 27.6 cents on the 240-pound hog worth, at a farm price of hogs of \$10 per hundredweight, or a trifle over 1.1 per cent; this would rise and fall with the farm price of hogs. Relatively, therefore, the increase in freight rates has been less for hogs than for corn.

Let us take it for granted, with more or less pronounced relative overproduction of corn and hogs, continuous surplus of corn and hogs, and little or ineffective co-ordination in marketing and shipments, that the increase in the present freight rate over the pre-war freight rate has been carried largely by the farmer. Under this assumption, it follows that farmers who have shipped corn from points corresponding to Marshalltown to destinations corresponding to Chicago received 3.4 cents per bushel less than they would have received at the pre-war freight rate; similarly, farmers who correspondingly shipped hogs received 11.5 cents per hundredweight less than they would have received at the pre-war freight rate. This

may not look like much money, but the farmer feels that it is directly subtracted from the net profit of the farm.¹

With heavier taxes, larger interest charges, increased cost of hired labor, and higher prices of implements and improvements, the higher freight rates are one more item in a series of factors contributing to reduction of the net income of the farm. From the standpoint of the farmer, the fact that money paid by him for higher freight rates goes largely into railway taxes and wages of railway workers, and not into payments to railway bondholders and stockholders, is a matter of practical indifference. Farmers generally recognize that railway service is better than ever before and that the improved service in movement of hogs may tend to have an influence on returns. At the same time, they continue to hold the general view that corn and hogs could possibly be carried at pre-war rates, certainly below existing rates, if rates were elevated on classes of commodities in which the expense of transportation constitutes a relatively insignificant proportion of the selling price.²

¹ The detailed reports of the operations of Class I carriers by rail now being issued quarterly by the Bureau of Statistics of the Interstate Commerce Commission in *Freight Commodity Statistics of Class I Railways in the United States* afford information on freight paid on shipments of corn and hogs. During the twelve months from October 1, 1928, to September 30, 1929, and from October 1, 1929, to September 30, 1930 (periods practically identical with the corn and hog crop years), the corn and hog traffic originated by Class I carriers and the revenue accrued from corn and hog shipments were as follows:

	1928-29	1929-30
Corn		
Revenue freight originated (<i>short tons</i>) . . .	16,206,016	14,496,151
Freight revenue (<i>dollars</i>)	64,276,560	54,519,972
Hogs		
Revenue freight originated (<i>short tons</i>) . . .	5,605,151	5,099,393
Freight revenue (<i>dollars</i>)	35,562,995	32,956,644

As farmers view these rates, in the light of the conditions of loading, perishability, expedition, and value, if the freight rates on hogs are adequate from the standpoint of the carriers, the freight rates on corn must be too high.

² Freight rates were raised slightly on corn in August 1931 and on hogs in October 1931, in accordance with regional adjustments which did not affect all points. Therefore, the rates used above in illustration may be allowed to stand. The request of the carriers for a horizontal advance in freight rates of 15 per

LAND VALUES

Attention is frequently drawn to depression in the corn belt by instancing the decline in land values and the increase in farm mortgages. The data on land values must be interpreted with caution. The prices of corn and hogs, or net returns on corn and hogs, are not the only factors influencing land values and farm mortgages. Farm mortgages may be both cause and effect of farm depression; and advancing land values may be the indirect cause of later farm depression as well as the reflection of previous farm prosperity.¹

The census classifies farmers as full owners, part owners, managers, and tenants. Of 6,288,648 farms reported in the agricultural census of 1930, 2,911,644 were operated by full owners, and 656,750 by part owners; there were 2,664,365 tenants and 55,889 managers. Landlords, to a small extent, are individuals, or corporations, engaged in large-scale operations run by managers with work crews. For the most part, landlords are retired farmers and other townsmen (merchants, bankers, lawyers, physicians, etc.) who own farms and let them out to tenants. The landlords may pay cash wages and take the crops, or the tenant may pay cash rent and take the crops, or the tenant may pay share rent. The tenants are for the most part

cent was denied and specific increases in rates on corn and hogs were not authorized. Presumably, therefore, the present rates are due to stand for the time being. It is not too much to say that farmers in the corn belt stood aghast at the request for a horizontal elevation of freight rates on agricultural products. Viewed as an internal problem, it is not to be questioned that some carriers by rail need additional revenue; but farmers have only to point to numerous statements by railroad executives to show that horizontal changes in freight rates, upward or downward, are not to be technically justified. That the freight-rate level should rise with a falling general price level the farmers find incomprehensible, past all concepts of economics.

¹ It is a common statement in the corn belt that farm land values are a result of farm prosperity and not a cause. As a long-term statement, this is too broad, since the influence of other factors is not to be denied, even though not computable. As a short-term statement, it is obviously untrue, since for farms, as well as for securities and factories, booms develop prices that are not the result of prosperity properly defined.

operating farmers who intend to become owners, and to a considerable extent are the sons of farmers who are, or have been, owners. The interests of owners operating farms and tenants leasing farms from owners of similar type are in the main identical. The group of farmers classified in the census as full owners and the tenants who are on the way to becoming full owners are the backbone of the corn belt.

According to the census, land values in the United States practically doubled from 1900 to 1910 and again from 1910 to 1920. This corresponds roughly to compound interest at 7 per cent. No land economist pretends that these increases (probably exaggerated) in reported land values were reflected in land rent as equivalent to interest on prudent investment. Such an inference would imply a quadrupling of rent in two decades, for which there is no evidence in farm accounting. The advance in land values was quite largely the expression of social development with advancing settlement and speculation attendant thereon.¹ In 1930 land values had dropped to about 64 per cent of the 1920 level.

According to the census reports, the amounts and values of farm land in Ohio, Indiana, Illinois, Iowa, and Nebraska combined were as follows in the years indicated:

Item	1900	1910	1920	1925	1930
All land in farms (<i>thousand acres</i>)	143,402	150,481	152,254	148,172	150,626*
Value of land in farms (<i>million dollars</i>)	4,762	10,121	19,477	12,090	9,782*
Value of farm land per acre (<i>dollars</i>)	33.21	67.26	127.93	81.59	64.94*

* Preliminary.

¹ In Austria there is a tax on increase in land values; this tends to check booms, but also retards sales.

The increases in farm land values between 1900 and 1920 were due largely to rise in value per acre excluding improvements, not to enlargement of acreage in farms. The reported valuation in 1930, it is to be noted, is below that of 1910.

As is evident, the average value of farm land per acre was \$33.21 in 1900, \$67.26 in 1910, \$127.93 in 1920, \$81.59 in 1925, and \$64.94 in 1930. Of these states, land values in Iowa displayed the most spectacular course: beginning with \$36.35 per acre in 1900, the figure rose to \$82.58 in 1910, and \$199.52 in 1920, declining to \$119.28 in 1925, and to \$93.68 in 1930. According to the census, therefore, the average value of land per acre in Iowa rose during two decades to nearly 550 per cent, and following the decline still stood in 1930 at roughly 258 per cent of the value in 1900. During these decades, progressive management was being introduced into corn and hog production, improvements were being built, and there was development in diversified agriculture. But the growth of operative returns does not now seem to have justified the rise in land values; nor did the decline after 1920 reflect a corresponding state of operative earnings. It is one thing to say that the census reports of farm values were so much in 1920 and so much in 1930. But this does not imply that the farms declined in worth, or in earning power, during that interval by the amounts in the census values as reported. It may have been more or less. According to opinion in the corn belt, the reduced land values reported in the census of 1930 (9,782 million dollars for the five states) corresponded approximately to the value level of 1910. Whether the dollar in farm land value earns as much as in 1910 is doubtful.

Not only have land values declined, improvements have deteriorated. Fences have not been kept up and painting of houses and barns has been neglected. This has been due in part to high prices of materials, in part

to low cash income. Probably, the unmortgaged farms have had their improvements better maintained than the mortgaged farms. The decline in land values therefore expresses less than the full decline because of the depreciation of improvements. In a sense, farm debt is really larger than the figures would indicate, to the extent of the sum it would cost to bring the fixed improvements into proper condition. This applies most to the older parts of the corn belt.

The latest, and probably the best, picture of land values in the corn belt is to be found in a publication of the United States Department of Agriculture entitled *The Farm Real Estate Situation, 1928-29*. From this circular we have prepared Table 22, which contains land values for the corn-belt states from 1912 to 1930. For our purposes the values of Indiana, Illinois, and Iowa are probably the most representative. The states in the fringe of the corn belt—Ohio to the east, Minnesota to the north, Missouri to the south, and South Dakota, Nebraska, and Kansas to the west—contain so much agricultural enterprise other than corn and hogs that the figures for the central states would seem most representative of the corn belt.

One of the rather striking features is the variation in the decline since 1921. Land values in Iowa seem to have remained above the pre-war level; in Illinois the reported values are slightly below the pre-war; in Indiana the decline has been much heavier. Of the inner states of the corn belt, Iowa has best maintained land values.¹ This material is to be regarded as especially significant, not so much in respect to absolute values as in relation

¹ But land values have been as well or better sustained in the periphery of the corn belt, in Nebraska and Kansas and especially in Minnesota. The low values in South Dakota and Missouri have doubtless special causes. Other factors than corn and hogs have more to do with land values in the periphery than in the center of the corn belt.

TABLE 22.—INDEX NUMBERS OF ESTIMATED VALUE PER ACRE OF FARM REAL ESTATE
IN CORN-BELT STATES, 1912-30*

(1912-14 = 100)

Year	Ohio	Indiana	Illinois	Minnesota	Iowa	Missouri	South Dakota	Nebraska	Kansas
1912.....	98	98	97	95	96	97	96	98	101
1913.....	100	100	100	100	99	100	101	100	99
1914.....	102	102	103	105	104	103	103	102	99
1915.....	107	101	102	107	112	102	101	101	103
1916.....	113	110	105	122	128	108	108	104	109
1917.....	119	116	111	138	134	115	116	110	115
1918.....	131	128	119	155	145	125	126	127	122
1919.....	135	135	130	167	160	137	145	145	132
1920.....	159	161	160	213	213	167	181	179	151
1921.....	134	147	153	212	197	156	173	166	149
1922.....	124	119	126	187	162	133	146	144	130
1923.....	122	115	123	177	156	127	126	139	127
1924.....	118	108	116	170	143	117	117	128	118
1925.....	110	102	115	159	136	112	115	123	115
1926.....	105	95	109	155	130	104	107	123	113
1927.....	99	87	99	145	121	99	97	119	113
1928.....	96	84	96	140	117	96	96	117	113
1929.....	94	83	95	138	116	95	95	116	113
1930.....	90	80	91	133	113	92	93	113	113

* Data from E. H. Wierling, *The Farm Real Estate Situation, 1928-29* (U.S. Department of Agriculture Circular 101), December 1929, p. 11, and *Agriculture Yearbook, 1931*, p. 1025.

to the variations from state to state, since in that sense the data are adapted for comparison.¹

FARM DEBT

There is no occasion here to enter into an exhaustive analysis of the situation in respect to credit in the corn belt. The subject of agricultural credit has been extensively examined since the war. Two excellent appraisals are to be found in *The Condition of Agriculture in the United States and Measures for Its Improvement: A Report by the Business Men's Commission on Agriculture*, published jointly in 1927 by the National Industrial Conference Board and the United States Chamber of Commerce, and in *Agricultural Reform in the United States*, by J. D. Black, published in 1929. Credit requirements in the corn belt differ from those in the Appalachian States, in the cotton belt, in the range country of the Rocky Mountain States, or in the fruit belt of the Pacific States. It will suffice here to present the conservative view of the corn belt.

Institutions of credit are not lacking; it is their functioning and management and the cost of credit which are unsatisfactory. The Federal Farm Loan System and the Federal Intermediate Credit System are the virtual foundations of agricultural credit, established since the war. Extending farm credit directly or indirectly are the national banks, the state banks, trust companies and savings banks, insurance companies, and private lenders. The Agricultural Credits Act of 1923 provided for the setting up of national and state agricultural credit corporations.

¹ The bulletin also contains farm bankruptcies, by states, for the years 1922-1928. These figures seem to us much less suggestive than they are commonly regarded, because the year in which a farmer goes into bankruptcy does not indicate when he became insolvent. The state of insolvency, some time before the date of bankruptcy, and the early or late occurrence of farm bankruptcy, depended as much on the creditors as on the debtors, as well as on various external circumstances.

For various reasons, these have failed to eventuate, to any considerable extent, and the workings of the existing units have been unsatisfactory. The problem still exists of conjoining the post-war credit agencies with the pre-existing system. The view is gaining ground in rural circles that the best direction for development lies in the organization of agricultural credit corporations conjoined with agricultural co-operative associations in the regions where co-operation is well developed.

There have been too many country banks, with too little capital. Henceforth, the minimum capital stock of a country bank in the corn belt ought not to be under \$50,000. In the Prairie Provinces of Canada, under branch banking, farm credit and country banks have been protected in a manner in striking contrast with the conditions in the central United States. The state banking departments have often lacked adequate management and exercised poor control. When farmers in the corn belt became speculative, the country banks often aided and abetted them; but after the deflation, the same country banks often denied farmers banking facilities. The widespread collapse of country banks deprived many farmers of credit contacts, especially west of the Mississippi; bank failures in the corn belt were much more frequent west of the Mississippi than east of the Mississippi. To a considerable extent, the imperfections of country banking have compelled farmers to secure credit from the buyers of their products.¹

One of the difficulties with farm credit, especially in the corn belt, lies in the different uses of credit. Numerous are the occasions for short-term credit, from three to nine months. Crop loans need a duration of nine to twelve months. Various farming operations require a credit of from one to three years. Probably the average term of

¹ Cf. J. W. Pole (Comptroller of the Currency), "Our Banking Troubles," *World's Work*, June 1931, LX, 23.

bank loans is close to a year. Finally, there are the mortgages on land, running from five to twenty years. A common routine has been to secure credit for longer terms by renewing ninety-day paper. A common error has been the failure to separate credit for farm operations from credit for subsistence supplies for the family, though it is freely to be granted that this separation is difficult and sometimes impractical.

Interest rates have been too high, especially for short-term paper. This has been in part the consequence of multiplicity of country banks, lax management, and speculative pursuits, of which the final expressions were in the interest rates. To a considerable extent, interest rates have been high because local institutions have not availed themselves, since 1923, of the privileges accorded under the federal credit legislation; but this has been the case largely because local institutions have not been satisfied with the profit permitted by the national agencies. It is not possible to indicate what should be the going rates of interest for agricultural credits—from prime commercial ninety-day paper to long-term mortgages—but there is no reason to question the conviction of farmers in the corn belt that the rates have been consistently too high. The explanation does not lie entirely in the rapacity of money lenders; many farmers have been poor risks. Also, the lack of calamity insurance has contributed to the high cost of farm credit.

In western Europe agricultural credits seem to have been better worked out than in the United States. Under state aid, management has been efficient and the several forms of credit have been effectively adapted to varying circumstances. As a rule, the rate of interest has been substantially lower. In particular, the system of payment of farm mortgages by amortization has been developed in Europe. This provides an obvious factor of safety, and obviates the maturing of an excessive proportion of debt

at one time. In the corn belt, an unusual proportion of debts fell due in 1930 and had to be funded under difficult circumstances, which would have been avoided under a system of amortization.

The corn belt, like the other sections of the country, needs to evolve an improved system of appraisal of land values and of earning capacities of land. If this were secured, the loan limits could be apportioned, losses would be avoided, and interest rates reduced. With expansion of credit corporations in relation with co-operative associations, the country banks would have less to do with crop loans and more to do with incidental short-term credits. Mortgages on land should be handled more through agencies operating under the Farm Loan Board, by insurance companies and private investors, and less by state banks. Despite custom in the corn belt to the contrary, it is becoming recognized that the functions best exercised by country banks are related to the short-term credit requirements of the community, both urban and rural; loans for farm improvements and mortgages on land, perhaps even crop loans, are better handled through larger agencies.

The Business Men's Commission on Agriculture recognized in the agricultural credit corporation the instrument offering the best prospect of control and distribution of credit. But the Commission did not believe that the capital of the intermediate credit banks should remain governmental, regarding it as not "a sound conception of the duties of the Federal government" to conduct "a permanent banking business for the agricultural industry."¹ The farmers in the corn belt regard this as a reactionary position, in view of the indirect services which the Federal Reserve System contributes to urban industry.

With these general comments written to reflect repre-

¹ *The Condition of Agriculture in the United States and Measures for Its Improvement*, p. 253.

sentative opinion in the corn belt, let us consider the present status of farm mortgages in that region.

Table 23 presents the mortgage data for owned (i.e., fully owned and partly owned) farms for the censuses of 1900, 1910, 1920, 1925, and 1930 for Ohio, Indiana, Illinois, Iowa, and Nebraska. The total number of farms of this class has declined significantly over the interval.¹

TABLE 23.—NUMBER OF FULLY OWNED AND PARTLY OWNED FARMS REPORTED AS MORTGAGED AND FREE FROM MORTGAGES IN OHIO, INDIANA, ILLINOIS, IOWA, AND NEBRASKA IN 1900, 1910, 1920, 1925, AND 1930*

Year	Total number of fully owned and partly owned farms	Free from mortgage	Mortgaged	Not reported
1900.....	734,979	434,941	283,359	19,980
1910.....	697,965	422,845	266,587	8,533
1920.....	639,330	325,001	254,584	59,745
1925.....	632,060	.....*	246,634*
1930.....	584,009	285,174	265,841	32,994

* Data from *Fourteenth Census of the United States, 1920*, V, 136-38 and 484; *United States Census of Agriculture, 1925*, pp. 20-22, and preliminary mimeographed releases for Census of 1930.

* No data.

The number of owned farms reporting mortgage debt is surprisingly constant over the interval, falling from 283 thousand in 1900 to 247 thousand in 1925, but rising to 266 thousand in 1930. In 1900, 1910, 1920, and 1930, the number of owned farms free from mortgage exceeded those under mortgage, and it is to be inferred that this was also true in 1925. Of course, it is not to be assumed that farms remained in one or the other category over the

¹ The data are not exactly comparable; in the census of 1925 farms free from mortgage debt were not specifically reported as in the three previous decennial censuses. It follows from this that no figure can be given for the number of farms making no report on the questionnaire of mortgage or free from mortgage.

entire decade; but the proportion free from mortgage at each census is significant.

We think it may be fairly inferred from these figures that a large proportion, possibly a majority, of the 584 thousand owned farms in these five states in 1930 were in the hands of their present owners prior to 1916. Otherwise, we would need to infer that farms purchased since 1916, first at rising and later at declining values, were purchased for cash and the owners needed to contract no mortgage debt in order to place them into operation. If this general inference is correct, then the proportion of farmers in the corn belt who are trying to earn interest on inflated land values is lower than has been commonly believed. That over half the owned farms in these five states did not report mortgage debt in 1930 is important, because, no matter on what actual investment level farmers without mortgages are trying to earn returns, they have at least no interest charges to pay on borrowed money.

Table 24 presents the mortgage data for fully owned farms in Ohio, Indiana, Illinois, Iowa, and Nebraska for the census years indicated.¹

There has been a very marked change in the relation of mortgage debt in the five states. While value of land and buildings (on farms reporting mortgage debt) declined from 4,122 million dollars in 1920 to 2,929 million dollars in 1925, and to 2,446 million dollars in 1930, reported mortgage debt rose from 1,082 million dollars in 1920 to 1,315 million dollars in 1925, but declined again in 1930 to 1,080 million dollars. Still, the most significant feature is not the change in mortgage debt, but the decrease in land value. Highly significant, also, is the fact that, although the proportion of fully owned farms re-

¹ For the last four censuses, the reported mortgage debt on fully owned farms in the United States has been as follows, in million dollars:

1910	1,726	1925	4,517
1920	4,004	1930	4,080

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TABLE 24.—FARM MORTGAGE DATA FOR OHIO, INDIANA, ILLINOIS, IOWA, AND NEBRASKA, 1900, 1910, 1920, 1925, AND 1930*

Item	1900	1910	1920	1925	1930
Number of fully owned farms	593,769	550,392	520,256	512,197	447,527
Number of fully owned farms reporting amount of mortgage debt.....	.....°	190,061	196,474	184,573	188,828
Relation of number of farms reporting amount of debt to total number of fully owned farms (<i>percentage</i>)....	.....°	34.5	37.8	36.0	42.2
Value of land and buildings on fully owned farms reporting the amount of debt (<i>million dollars</i>) .....	.....°	1,949	4,122	2,929	2,446
Amount of mortgage debt (<i>million dollars</i>) .....	.....°	504	1,082	1,315	1,080
Relation of mortgage debt to value of land and buildings on farms reporting debt (<i>percentage</i>) .....	.....°	25.9	26.2	44.9	44.1
Average amount of mortgage debt per fully owned mortgaged farm (<i>dollars</i>) .....	.....°	2,650	5,507	7,123	5,718

* Data from United States census reports. According to these data, in 1930, 42 per cent of full owners operating their farms reported mortgage debt, and the total reported mortgage debt represented 44 per cent of the aggregate value of their land and buildings. This does not mean that 58 per cent had no mortgage debt, since earlier census experience has indicated that the sum of the positive and negative answers to a census questionnaire does not total 100 per cent. In the Census of 1920, in the same five states, 53 per cent of farms operated by full owners were reported free from mortgage debt, 38 per cent reported mortgage debt, while reports were lacking for 9 per cent. Similar data for full owners for 1930 are not yet available. However, if one may judge by the data in Table 23 above (for fully and partly owned farms), the proportion free from mortgage has probably declined, the proportion mortgaged increased, and the proportion not reporting declined. It is to be noted that although the number of farms reporting debt has increased in 1930 over the number in 1925, the amount of debt (both total and per farm) has decreased.

° No data.

porting mortgage debt was apparently somewhat smaller in 1925 than in 1920, it has increased in 1930.

Mortgages are evidences of debt, but such debt is presumably more often of constructive intent than otherwise. Farm mortgages usually represent original investments, with subsequent additions for improvements, equipment, or added acreage. To some extent, however, farm mortgages represent liquidations and losses, also the refunding into mortgage form of unpaid floating debts. To a considerable extent, finally, farms are mortgaged to secure funds to send off the farm. Presumably, the increase in mortgage debt from 1910 to 1920 was largely constructive, or at least expansive, but the increase from 1920 to 1925 represented losses and refundings rather than added investment. The decrease from 1925 to 1930 was due to liquidation, it is to be inferred.

The inevitable effect of increasing mortgage debt on fixed charges may be illustrated for the corn belt by the use of the census data. Confining the illustration to Indiana, Illinois, and Iowa, in 1910, 127,498 fully owned farms (39 per cent of the total of this class) reported a mortgage debt of an average amount of \$2,961. In 1920, 129,420 fully owned farms (41 per cent of the total of this class) reported mortgage debt of an average amount of \$6,122. In 1925, 119,832 fully owned farms (39 per cent of the total of this class) reported mortgage debt of an average amount of \$8,043. In 1930, 120,487 fully owned farms (45 per cent of the total of this class) reported mortgage debt of an average amount of \$6,344. Taking the rate of interest at 6 per cent (which may or may not be near the average), the annual fixed charge per average mortgaged fully owned farm has been as follows:

1910	\$177.66
1920	367.32
1925	482.58
1930	380.64

The average interest charge has thus increased by \$202.98 per farm. According to the data of the Census of 1930, the average acreage of fully owned farms reporting mortgage debt in the three states was 121; therefore, the average interest charge, at 6 per cent, was \$3.15 per acre in 1930. Unless the average crop yield per acre has increased since 1910 to an extent corresponding to the growth of interest charges, the augmented interest charge represents a subtraction from the gross income. Outturn per man has increased in the corn belt during this interval; but it is probable that outturn per acre, of corn and hogs, has not increased comparably with the growth of interest charges. To whatever extent outturn per acre has increased, this could not be applied against increase in interest charges except after adjustment for possible increase in operative costs.

Without entering further into the reasons why many farmers operating fully owned farms in the corn belt have greatly increased their mortgage debt from 1910 to 1930, while others of the same class have remained free from mortgage debt, it is important to point out the disability imposed on the mortgaged group by fixed interest charges, as contrasted with farmers in the unmortgaged group. Farmers without mortgages would naturally find current prices much less unsatisfactory than farmers whose interest charges amounted to \$380.64 a year. At the least, such a difference would represent relative prosperity contrasted with relative unprosperity; and for many farmers, \$380.64 annually is enough to spell the difference between success and failure. For the farmer free of interest charges, parity of purchasing power of farm products might mean something approaching recovery of pre-war prosperity, apart from taxes.¹ For the

¹ Cf. A. H. Hansen's review of E. L. Kirkpatrick's book on *The Farmer's Standard of Living* in *Journal of the American Statistical Association*, June 1930, XXV, 233-34.

farmer obligated to pay \$380.64 interest annually, parity of purchasing power of farm products would bring about nothing to be compared with pre-war prosperity. A farmer in such a situation must either increase his income by higher prices, reduce his operating costs, or fall behind in the scale of living. Unable to sell the farm for the original purchase price, many farmers under an impost of \$380.64 annually would lapse into foreclosure and leave the country.

C. L. Holmes of the Iowa State Agricultural College, testifying as an expert before the Interstate Commerce Commission,¹ presented summaries of the mortgage position in Iowa which are probably fairly representative of the corn belt. The proportion of land under mortgages rose from around 38 per cent in 1915 to 50 per cent in 1925. Mortgages contracted between 1915 and 1920, inclusive, were mostly for purpose of investment; the mortgages placed between 1921 and 1925, inclusive, were largely junior mortgages representing funding of floating debt. Thus in 1915, 47.8 per cent of new mortgages were purchase-money mortgages, and this rose to 72.3 per cent in 1920; thereafter, this type of mortgage declined to 27.3 per cent in 1921, and in the four following years was below 20 per cent. Of the mortgaged farms in 1925, about one-seventh were in distress. Foreclosures represented mostly cases of purchase at inflated value; in 1926 the average foreclosure involved land currently valued at \$158 per acre with a debt of \$220 per acre. This testimony was so good qualitatively that it seems fair to lay stress on the facts as adduced, especially in view of the high standing of the witness.

¹ Interstate Commerce Commission, *Rate Structure Investigation, Grain and Grain Products within the Western District and for Export*. Docket 17000, Part 7, Abstract of Evidence, pp. 148-49. See also W. G. Murray and F. L. Garlock, *Farm Mortgage Debt in Iowa* (Iowa State College Agricultural Experiment Station Current Economic Series Report No. 6), October 1927, and F. L. Garlock, *Long Term Loans of Iowa Banks* (Iowa State College Agricultural Experiment Station Research Bulletin No. 129), June 1930.

There is evidence that the increase in mortgage debt in the corn belt from 1910 to 1930 was only in part the result of operative returns. The increase in this debt from 1920 to 1925 may reasonably be regarded, in part at least, as due to low prices of corn and hogs. But for the most part the mortgages contracted between 1910 and 1920 were for improvements, extension, and ventures into new investments. They were largely the result of prosperity and expectations of continued or even expanding prosperity, not the result of adversity. When the late Henry C. Wallace wrote his well-known editorial in *Wallaces' Farmer* in January 1920, advising overextended farmers to pay their debts and not venture further into promoted enterprises, he gave no hint of holding the belief that Iowa farm mortgages were the result of adversity. It may be urged that if prosperity had continued after 1920 the mortgages would have been paid off instead of being augmented: a farmer deeply in debt is in no position to bear low prices for products, a farmer out of debt can for a time adjust himself to low prices for his products. This holds true for every line of business; in no line of business have the operators the right to expect prices for commodities to be such as to insure redemption of misguided investments or debts resulting from improvidence. Old-time farmers recognize this.

In estimates of farm mortgages it is not customary to correct these for change in the price level. It is the peculiar misfortune of many farmers that they borrowed inflated dollars and must pay back in deflated dollars. They borrowed under high prices and must pay back under low prices. From this angle, as from every other viewpoint, the position of farmers owning their farms without mortgages is strikingly superior to the situation of those with mortgages.

But the advantage enjoyed by those operating fully owned farms without mortgage debt should not be ex-

aggerated. With many farmers of this type (the best type in the corn belt) there is a dark side to the picture. These farmers had usually accumulated financial reserves. These financial reserves were invested, usually in local enterprises. Quite commonly, such farmers were shareholders in country banks and were inclined also to maintain relatively heavy deposits in these banks. Such holdings and deposits have in recent years become frozen to a large extent; to a large extent outright losses consequent on bank failures have wiped out reserves built up by years of good farm management. It is true the farmer free of mortgage debt has no fixed charges of interest; but he may still have lost heavily in the agricultural depression.

The decline in land values since 1920 cannot be used directly as a measure of decline in farm prosperity. Decline in land values implies decline in farm prosperity, but also a great deal more. Changes in land value are highly important in judging returns on farms, but they are likewise important in judging returns on speculation, and are indicative also of credit conditions and of the trend of population into or out of farming.

Not only is the funded farm debt of the corn belt much larger than before the war, it is certain that the unfunded debt also has risen. The unfunded debt is to some extent covered by chattel mortgages not included in the reports of funded debt. For the rest, the unfunded debt consists mostly of unpaid accounts at country stores and debts owed to implement dealers. Most of these are probably covered by notes which are unsecured. It is common knowledge that such unfunded debts exist in large amounts. Circumstances have compelled merchants and implement dealers year after year not merely to refrain from forcing collections, but still further to extend credit. Not to have done so would have resulted in abandonment of farms in many cases. In short, the farmers and the

townsmen in the corn belt are in the same boat; the farmers are waiting for better times and the merchants are carrying them along in the same hope. Total farm mortgages in the United States in 1930 approximated 9.5 billion dollars. This is less than 25 per cent of the then declared valuation, but the percentage is much higher than in previous censuses.

It is a striking circumstance that farm indebtedness expanded in most countries during the war or subsequent to it. This holds even for countries in which existing debts were practically wiped out by depreciation of currency. In Germany the existing farm mortgages were largely paid off during the period of extreme depreciation of currency that preceded the establishment of the Dawes Plan. But during the five years' operation of the Dawes Plan, farm mortgage debt in Germany rose rapidly again to over 3 billion dollars, at an average rate of interest of about 8 per cent.¹ Apparently, inflation or deflation of the price level, irrespective of cause, is likely to result sooner or later in an exaggeration of farm indebtedness.

If farm mortgages in the corn belt could be adjusted to their gold values beginning with 1895, there would be about two decades during which each dollar had a declining purchasing power in terms of agricultural products.

¹ In the report on Germany of the so-called Wiggin Committee (*Report of the Committee Appointed on the Recommendation of the London Conference, 1931, Basle, August 18, 1931*) there is no mention of the debts and distress of German agriculture. The subject of the report is introduced as follows:

"The crisis which has occurred in Germany during the last two months has supervened on a condition of exceptional world depression marked by a severe fall in wholesale prices on the international markets of the world, by a drastic reduction in international trade, by very widespread unemployment in industrial countries and by acute financial difficulties for agricultural communities dependent upon export trade." [Italics ours.]

This might be misinterpreted to imply that agricultural communities in importing countries have had no acute financial difficulties. So far as may be judged, the yeomen of importing England and the peasants of importing Germany have financial difficulties comparable with the peasants of exporting Hungary and the farmers of exporting Canada. The debts of German agriculture and the extreme tariffs and regulations imposed in the frantic efforts of protection for agriculture constitute integral factors in the German crisis.

There was a slow rise in price level. Then occurred a period of inflation until 1920, with rapid and heavy decline in the purchasing power of the dollar, a rapid rise in price level. The heavy deflation beginning in 1920 was completed around 1924; after a lull, the decline has continued in the case of agricultural staples. When farm mortgages in the corn belt were expanded heavily during 1919 and 1920, the all-commodity wholesale-price index number was over 200; the average farm prices of corn for the 1918 and the 1919 crops were 153 and 151 cents. Hogs brought \$16.60 and \$13.43 per 100 pounds. Relatively small amounts of corn and hogs were exchanged for relatively large amounts of money. The subsequent deflation of these prices back to the pre-war level and the corresponding increase in the purchasing power of the dollar did not change the sum of the mortgage, the rate of interest, or the interest charge. The annual interest charge has been paid in the corn belt (disregarding other products) with corn selling at considerably below a dollar and hogs often below ten dollars. This year it requires a much larger amount of the commodity (corn and hogs) to exchange for a relatively smaller amount of money in return: but the commitments in terms of currency are unchanged. Debts and taxes in the corn belt have been possibly almost as burdensome as low prices of corn and hogs.

FARM TAXES

It is a matter of common knowledge that farm taxes have much increased since 1914, both relatively and absolutely. According to the United States Department of Agriculture, average taxes per acre of farm land in the United States increased 126 per cent from 1914 to 1922.¹ Other estimates are as high as an index of 250. We are

¹ Eric Englund, "Taxation in Relation to Agriculture," read before the Round Table on Agriculture, Institute of Public Affairs, University of Virginia, August 10, 1928.

not advised whether taxes in the corn belt have been increased relatively more or less than elsewhere in the country. In view of the extensive public improvements undertaken in these states, it would seem safe to assume that their taxes have risen as much as elsewhere. In Kansas, the ratio of taxes to selling value of farm land doubled from 1910 to 1923. The position of taxes is perhaps most clearly shown on the rented farm, and the ratio of tax to rent has risen strikingly. In a study of farm taxes on cash-rented farms in Michigan, it was shown that over a period of seven years since the war an average of 52 per cent of the net rent was paid in taxes. When the figure of increase of taxes over the pre-war quoted above is corrected for change in the value of money, the increase still remains high.

While taxes may be judged either by valuation of property or by earnings, comparison with earnings affords the best yardstick, as is illustrated in corporation practice. In the case of land, perhaps the best way, and certainly the easiest one, is to compare taxes with rents. Since there is a large amount of tenantry in the corn belt, contrasting taxes with rents furnishes a good measure of the height of taxes. In such a comparison it is assumed that a man working the farm which he owns combines the functions of landlord and tenant, and in this sense the comparison of taxes with rents finds general application.

J. E. Brindley and G. S. M. Zorbaugh have prepared data illustrating the relation of taxes and rents in Iowa for various years since 1913. These data are given in somewhat rearranged form in Table 25. The increase in the ratio of taxes to rent is strikingly illustrated, nor is the position substantially modified by the slight decline in evidence in the later years. It seems likely that the situation in Iowa does not represent the position of the corn belt at its worst. As we have pointed out,¹ land val-

¹ See above, pp. 296-97.

TABLE 25.—TAXES AND RENT OF FARM LAND IN IOWA, 1913–27*

Year	Taxes on owner-operated farms (dollars per acre)	Taxes on cash-rent farms (dollars per acre)	Net rent (dollars per acre)	Relation of taxes to rent on cash-rent farms (percentage)
1913.....	0.67	0.57	4.18	13.7
1914.....	0.76	0.66	4.58	14.4
1915.....	0.77	0.70	4.37	15.9
1918.....	0.86	0.85	5.28	16.0
1921.....	1.72	1.53	7.11	21.6
1922.....	1.49	1.70	5.15	32.9
1923.....	1.73	1.53	4.24	36.1
1926.....	....	1.36	4.90	27.7
1927.....	1.53	1.30	4.54	28.7

* Data from J. E. Brindley and G. S. M. Zorbaugh, *The Tax System of Iowa* (Iowa State College Extension Bulletin 150), p. 55.

ues have been as well sustained in Iowa as in other states in the corn belt and presumably rents have held with land values. Since Iowa has not been characterized by lavishness in public improvements, contrasted with the other states in the corn belt, it possibly follows that the ratio of taxes to rents is even higher elsewhere in the corn belt than in Iowa.

When taxes become delinquent, the farms are sold to secure the sums due. To a surprising extent in different parts of the country, farms put up for sale to cover delinquent taxes could not be sold for enough to clear the default. The problem of the disposition of land thus left in the possession of the county is becoming difficult in some states.¹

The increased taxes have been largely used for public improvements and betterments in governmental functions, such as schools. The consolidated school district and the

¹ B. H. Hibbard, John Swenhardt, W. A. Hartman, and B. W. Allin, *Tax Delinquency in Northern Wisconsin* (University of Wisconsin Agricultural Experiment Station Bulletin 399), June 1928.

larger school unit are important advances in country education. In part, the public constructions were put in with high-priced materials. To some extent, they may have been constructed lavishly and wastefully, under political management. Probably some of the improvements were installed in advance of their time and in excess of the requirements of the population. Also, to a considerable extent, the public improvements have served the urban population as much as the farm population, though paid for predominately by taxes on farms. Broadly considered, therefore, high taxes on farms are quite largely the result of improvements in the scale of living of the area. The improvements are social, for so-called consumptive purposes. They raise the scale of living on the assumption that the public has the regular income to support it. Contracted for, to a considerable extent, in a period of high prices, they must be paid for in a period of low prices of farm products. High taxes have, for current operations, two serious drawbacks: being fixed charges, they reduce directly the income of the farm; also, they depress land values. Moreover, high taxes on railways raise freight rates.

In various parts of the corn belt, especially in Iowa, bonds have been issued to cover the cost of drainage necessary to adapt low land to the raising of corn. Successful drainage found prompt reflection in the price of the land, but also presupposed a certain level in the price of corn. With decline in the price of land and of corn, the service charges constitute a particular burden on the corn land involved.

The commercial value of highway improvements to farm operations in the corn belt is difficult of adjudgment. The farms located directly on paved highways tend to have their sale valuation elevated. Improved roads save time, facilitate marketing of crops, and lower costs. But if the service charges on the capital represented in the

improved highways in any one of the states in the corn belt were to be incorporated into the general tax burden, it seems probable that for most farmers the advantages would be secured at heavy expense. Certainly, the farmers in the corn belt hold the view that the highway systems as developed to date serve the townspeople of the state (and of other states) as much as the farmers of the locality. This explains the view becoming more generally held over the corn belt that highway improvements and maintenance should be paid out of the gasoline tax and federal road funds and not out of state or local bond issues.

One political reform lies in the hands of farmers themselves in the corn belt. Even under the existing tax system, reforms could be effected in state and especially in local taxation by improvements in appraisal and management of expenditures. Quite generally throughout the corn belt, taxation, like banking, suffers from antiquated and unskilful appraisal, followed by inefficient management of taxes once collected.

Farm taxation constitutes an inherently difficult problem. As a class, farmers pay little federal tax; they pay state, county, and township taxes, varying from state to state according to different systems. In part, farmers vote their taxes on themselves and, in part, taxes are voted on farm land by townsmen; but to a considerable extent farm taxes are the expression of an outworn and unreplaced revenue system. Once a public expenditure is set up to be covered by revenue secured from a tax, the tax tends to be irreducible. Current expenditures are not readily curtailed and amortization of long-term indebtedness admits of no abridgment. Public improvements and public expenditure tend to rise during prosperity and with increase in land values; farmers as well as townspeople always seem willing to elevate taxes with land values. When land values declined in the corn belt, this provoked critical difficulties, since the common property

tax is the outstanding form of taxation in those states. With decline of land values, the assessment ratio is elevated or the tax rate raised, or both. When, thereafter, the attempt is made to reduce the property tax and introduce a supplementary income tax, this runs counter to entrenched opposition, even in predominatingly agricultural states. The combination of opposition and inertia may suffice to delay or prevent tax reform, as has been well illustrated in Iowa during recent years.

It follows from these circumstances that, if purchasing power of farm products in the corn belt is to have the same meaning for farmers that the pre-war purchasing power held for them, it would need to be high enough to cover the enlarged taxes. The relative increase in price of corn and hogs necessary to achieve these objectives is hardly definable; but no one can doubt that it would be substantial. In short, farmers in the corn belt feel that, in effect, they pay taxes in the form of crops just as in some countries taxes and interest are collected in the form of crops.

J. R. Commons¹ has succinctly stated the position of the farmer in respect to taxes and debts, as follows:

The farmer's burden of taxes and debts has been increased both by the *larger amount* of taxes and debts payable in money, and by the larger amount of commodities required to be sold in order to pay the *same amount* of taxes and debts.

SUPPLY, QUALITY, AND COST OF FARM LABOR

Hiring out for farm work cannot be called a vocation in the farm belt. It is rather a form of apprenticeship, a step toward tenancy and later farm ownership. In consequence, whenever the prospects for tenancy and subsequent farm ownership are not inviting, the supply of farm labor tends to decline and the quality to deteriorate. This

¹ "Farm Prices and the Value of Gold," *The North American Review*, February 1928, CCXXV, 210-11.

is one of the reasons for the difficulties with hired help in the corn belt since the war. There is, of course, always a certain proportion of itinerant workers.

Restriction of immigration has affected the supply of farm labor both directly and indirectly: directly, because it has cut down the admission of young European peasants familiar with farming; indirectly, because it has reduced the supply of urban labor and increased the cost, whereby farm workers have been lured to urban occupations. Lowering the bars of immigration would bring no worth-while relief. The immigrants from the peasant class who now enter under the quotas prefer the town to the country; it is not feasible to " earmark " peasant immigrants for agricultural employment. If the immigrants were inclined to take up agriculture in this country, abandoned farms would appeal to them more than working for Americans or Americanized immigrants. The lure of America for European immigrants is the lure of the city, where lies the American prosperity that is (or was) so famous in Europe. We could secure from China, Japan, and Korea immigrants who would stay on farms; but there is no purpose in discussing the proposal. In short, whatever the shortage and high cost of farm labor, the remedy is not to be found in lessened restriction of immigration.¹

It is very difficult to set up an index for farm labor, even in the corn belt, because of local differences and seasonal requirements. A monthly rate by the year is one thing, a monthly rate for the summer is another thing, and the rate by the day is still another thing. The need for workers in dairying, in animal husbandry, and in cultivation and harvesting of plant crops naturally varies from area to area and from season to season. In the corn

¹ Cf. *The Condition of Agriculture in the United States and Measures for Its Improvement: A Report by the Business Men's Commission on Agriculture*, pp. 88-93; also J. D. Black, *Agricultural Reform in the United States*, pp. 436-46.

belt a seasonal peak of farm labor does not exist as in the wheat and cotton belts. But labor rates, and labor costs, have stood higher than crop prices in the corn belt since the war for the most part.

The shortage of farm labor is perennial, but it inclines to be shortage at a price. Many farmers in the corn belt would use more labor if wages were low and the workers were efficient. When the wage rate is high (in competition with unskilled labor on roads and in towns) and the workers inefficient, the farmer dispenses with it, even as a makeshift. With increase in mechanization of agriculture, less labor is needed, but the workers must be more skilled. Urban unemployment in 1931 has enlarged the supply of farm labor, with a significant lowering of the wage rate.¹ For a few years probably farmers in the corn belt have the prospect of securing both unskilled and skilled workers at a lower rate than at any previous time since the war.

SPREAD BETWEEN PRODUCERS' AND CONSUMERS' PRICES

Under this heading are included factors considered earlier in this chapter. It is not really a topic by itself. But it is so important, in the public mind as well as in fact, that it deserves restatement, even if some repetition is involved.

It is generally believed that prevailing prices of raw materials and of finished goods are separated by a disproportionate spread. The spread in prices between raw materials (at point of production) and finished goods (at point of consumption) is believed to be much wider relatively than it was before the war. Furthermore, the spread is believed to have widened during the past fifteen years by much more than a difference corresponding to

¹ In some localities farm wages are reported to have declined to the pre-war level.

the change in the value of money. This extension of spread between raw materials and finished goods holds for raw imported materials manufactured into finished goods in the United States as well as for raw agricultural products manufactured into foodstuffs and other consumers' goods in the United States. Warren and Pearson introduce a bulletin on *Interrelationships of Supply and Price*¹ with the following paragraph:

The increasing spread between farm and retail prices and the increasing violence in the fluctuation of farm prices were a serious problem even before the World War. With deflation, the maladjustment between farm and retail prices has been the most serious single factor in causing the agricultural depression.

It is difficult, as a technical procedure, to formulate an approximate statement of the dimensions and components of the spread between prices of raw materials and finished goods. So far as we are aware, this has never been comprehensively undertaken, for lack of comparable, representative, and trustworthy price material. It is indeed remarkable, as J. M. Keynes has emphasized, that no indexes of consumption exist. But the broad statement that a relative widening of the spread has occurred is supported by much collateral evidence dealing with particular commodities and finds general acceptance. The statement is supported by the data of the recent Census of Distribution.

The general complaint that the spread between farm prices of live hogs and retail prices of hog products since the war is excessive, contrasted with the spread before the war, is illustrated by price material brought together by Warren and Pearson.² Table 26, prepared from data in

¹ G. F. Warren and F. A. Pearson, *Interrelationships of Supply and Price* (Cornell University Agricultural Experiment Station Bulletin 466), March 1928, p. 5.

² *Op. cit.*, pp. 77-79. Corresponding computations are not available for corn, but little is thereby lost, since so small a part of the corn crop leaves the farm.

Tables 98, 100, 101, and 102 of their bulletin, contains figures for average farm prices of live hogs, average retail values of hog products, cost of slaughtering, packing, and distributing hog products, and index numbers of cost of slaughtering, packing, and distributing hog products. There may be a bias in these figures due to assumptions of comparability of weights and of services rendered; but even though the index numbers of the cost of slaughtering, packing, and distributing hog products since the

TABLE 26.—FARM PRICE OF HOGS, AVERAGE RETAIL VALUE OF PRODUCTS, AND ESTIMATED COST OF SLAUGHTERING, PACKING, AND DISTRIBUTING, 1910-14 AND 1920-30*

Year	Average farm price of hogs (dollars per 100 lbs.)	Average retail value of products (dollars per 100 lbs. of live hogs)	Cost of slaughtering, packing, and distributing (dollars per 100 lbs. of live hogs)	Index number of cost of slaughtering, packing, and distributing (1910-14 = 100)
1910.....	8.16	14.09	5.93	86
1911.....	6.29	13.11	6.82	99
1912.....	6.71	13.59	6.88	100
1913.....	7.49	14.86	7.37	107
1914.....	7.57	15.16	7.59	110
1920.....	13.02	29.39	16.37	237
1921.....	7.84	23.25	15.41	223
1922.....	8.40	22.29	13.89	201
1923.....	7.13	21.31	14.18	205
1924.....	7.48	21.51	14.03	203
1925.....	11.00	25.75	14.75	213
1926.....	11.80	27.16	15.36	222
1927.....	9.68	25.32	15.64	226
1928.....	8.75	24.04	15.29	221
1929.....	9.44	24.70	15.26	221
1930.....	8.82	23.84	15.02	218

* Data from G. F. Warren and F. A. Pearson, *Interrelationships of Supply and Price* (Cornell University Agricultural Experiment Station Bulletin 466), March 1928, pp. 77-79, supplemented by additional data furnished through the kindness of Professor Warren.

war were set somewhat too high, they would still remain quite significant.¹ The spread from farm to consumer includes transportation, commissions, slaughtering, curing, cold storage, wholesaling, retailing, selling and advertising, and retail delivery, with charges for interest, risk, and insurance. There is considerable waste included. It is not possible to segregate these items in the spread. But one cannot go far astray in making the assumption that the largest part of the increase in the spread is due to the higher wage levels² of the working groups engaged in the several services, and to the extension of services demanded by consumers. To what extent the spread includes higher compensation for the identical service or introduction of new services is not known. For the finished products of corn and hogs, it does not seem obvious that new services of note have been introduced during the past fifteen years. Since most corn and hog products entering into the diet are staples, it does not seem that the selling and advertising costs could have expanded as much as for nonessential and luxury goods. Yet the fact remains that the spread from producers' to consumers' prices has widened—unduly, it seems both to producers and to consumers.

COST OF LIVING

The Bureau of Labor Statistics of the United States Department of Labor publishes an all-commodity whole-

¹ For criticism and defense of the publication of Warren and Pearson, see H. I. Richards, "Middlemen's Margins as a Cause of the Agricultural Depression," *Journal of Farm Economics*, October 1930, XII, 523-51, and H. J. Stover, "Middlemen's Margins," *op. cit.*, July 1931, XIII, 447-59.

² According to our best information, the wages of industrial workers in 1929 stood at the highest peak noted since 1920. Reductions took effect in 1930 and still more in 1931, but the actual position of industrial workers' wages is not determinable. The non-deflation and relative constancy of urban wages has been reflected in the spread between farm prices of agricultural raw materials and consumers' prices of finished foodstuffs.

sale-price index number, established first on a pre-war base, but now computed on the base of the year 1926. We have no index of consumption; we have a tentative index of production. We possess no all-commodity retail-price index number. We have, however, an index number of the cost of living on the 1913 base issued semiannually by the Bureau of Labor Statistics. It is an index of urban prices. Without entering into an appraisal or criticism of this index number, it is worth while pointing out that it has the defect, commonly attached to index numbers of the cost of living, that new goods and services being taken up by consumers are not promptly and proportionally incorporated into the index. That is, the index lags behind the times. Also, the weighting itself is open to criticism. The index number of the cost of living includes prices of food, clothing, rent, fuel and light, house-furnishing goods, and miscellaneous articles. In the judgment of the writer, the rubric of food is not properly weighted, and the several foodstuffs within the rubric of food are not properly weighted. But the excellence of the index number of the bare cost of living has little bearing on the present discussion because it does not apply to the farm family. The highest point of the index was 217 in June 1920; it declined to 166 in 1922, rose to 178 in December 1925, and declined to 167 in June 1930, to 161 in December 1930, and to 150 in June 1931.

The Bureau of Agricultural Economics of the United States Department of Agriculture has established what corresponds to an index number of the cost of living on the farm.¹ These index numbers have been criticized in the rural press as well as in metropolitan papers. In our judgment the Department of Agriculture in this innovation has made an important step forward. Every index number improves with time, and this will hold true of the index numbers under consideration.

¹ See above, pp. 266-74.

In this publication¹ the Department made an admirable statement on the qualifications of the index numbers, which is here reproduced:

Users of these index numbers of farm prices and of prices paid by farmers are cautioned against their misinterpretation and misuse. These price index numbers do not measure changes in farm receipts or in farm expenses, and the ratio of prices farmers receive to the prices paid for purchases is not a measure of the purchasing power of the farmer. These index numbers do not take into account any variations in the quantities of crops sold or quantities of goods purchased. Furthermore, the prices used in constructing these index numbers do not represent all sources of receipts or all varieties of expenditures. The income from farming is spent not only for commodities purchased for the family living and for operating the farm but also for interest on mortgages and loans, rents, railroad fares and other items which are not represented by these index numbers. Strictly speaking, the ratio of the index number of prices received for farm products to the index number of prices paid for commodities purchased merely represents the power of a fixed quantity of selected farm products to purchase a fixed quantity of goods in relation to the base period.

It ought to be kept in mind that the development of the scale of living includes an increasingly larger proportion of services in relation to goods, that with progress of technical discoveries the prices of goods are likely to fall more than the prices of services; and since retail prices include more of services than do wholesale prices, it is too much to expect that retail prices will follow wholesale prices closely.

For the purposes of the present inquiry it suffices to bring out the application of the index numbers of the cost of living described above to be made by farmers in the corn belt. These indexes the farmer contrasts with selling prices of plant crops and animals produced on the farm.²

¹ U.S. Department of Agriculture, Bureau of Agricultural Economics, *Index Numbers of Prices Farmers Pay for Commodities Purchased* (mimeographed), (Washington, August 1928), p. 1.

² These index numbers were compared with the index numbers of the prices of corn and hogs on pp. 267-74 above.

Whether farmers use these as index numbers or employ the several selling and buying prices directly, the result is the same. There is a striking disparity between prices of products sold and of commodities purchased. There are, of course, conspicuous exceptions, such as automobile tires, and other articles cheapened by mass production. But in the aggregate, or expressed in index numbers, there is a wide spread between prices of raw materials sold by the farmer and prices of finished goods purchased by him. Which prices are relatively out of line, and whether the adjustment is best approached from the side of selling prices of farm products or purchase prices of finished goods, constitute subsequent questions.

In the use of terms of income prices and index numbers, care must be taken to avoid implications. The use of index numbers tends to make the determination and measurement of farm distress or prosperity appear easier in figures than it is in fact. It seems to have been widely assumed that if the purchasing power of farm products could be relatively restored to the pre-war position it would follow that agriculture had been restored to the pre-war position. This does not follow.

The scale or plane of living on the farm is difficult of appraisal. The regional differences are so marked that an average standard of farm living cannot be set up for the country. One cannot average the goods and services used by the one-mule cotton grower in Georgia, by the Polish peasant who has taken up an abandoned New England farm, by the herdsman on a sheep ranch in New Mexico, by the wheat grower in Kansas, and by the diversified farmer in Iowa to secure a composite picture of farm living in the United States. Furthermore, one must distinguish between the current costs of the pre-war standard of living and the current costs of the higher standard of living now desired in agricultural communities. Particularly in the corn belt, it would not be

regarded as satisfying if net farm income merely maintained the lower standard of living that was current before the war.

When, now, one undertakes to appraise farm distress or prosperity in the corn belt from the standpoint of crop prices in the light of fixed charges, operative costs, and living expenses, it becomes clear that restoration of farm purchasing power to par in terms of index numbers would not insure what farmers call prosperity. If hogs and corn, and the other cash crops of the corn belt, were to recover parity of retail purchasing power, this would not constitute restoration of the *status quo ante bellum*, for the reason mainly that the fixed charges which must be subtracted from gross revenue before net income is available for use in purchase of goods and services have become disproportionately heavy. Unless the per acre increase in fixed charges is compensated for by increase in outturn without corresponding increase in cost or by maintained outturn at lower cost, obviously the par purchasing power of farm products will not enable the customary scale of living to be continued. When this is realized, the interrelation of net income, cost of living, and scale of living acquires a new importance for the corn belt.

CONTRAST BETWEEN FARM INCOME AND URBAN INCOME

Since the war, in consequence of the development of statistical procedures and the widespread interest in numerical interpretations of our economic life, a great deal of attention has been given to the distribution of income. Year after year estimates, abstracts, or tables are published in the rural press. Such figures are usually supplied by government departments or by independent research organizations.¹ The intent embodied in such fig-

¹ Cf. M. A. Copeland, "The National Income and Its Distribution," *Recent Economic Changes in the United States* (published for the National Bureau of Economic Research by McGraw-Hill Book Company, New York, 1929), II, 781;

ures is not to be questioned. The average man is in no position to question their accuracy. All figures running into large numbers, or into decimal places, impress readers. Quite naturally, therefore, farmers in the corn belt place some reliance on such pronouncements. The farmer reads that in 1928 the per capita income of the farm population outside of the fourteen Southern States was \$470, compared with \$760 for the non-farming population; this is clearly a provocative statement. The farmer reads that with 25 per cent of the population on the farm, the farmers' proportion of the national income is far below that percentage, and the putative percentage credited to him runs all the way from 10 to 17 per cent. Robert Stewart¹ has made the declaration that "twenty-six and three-tenths per cent of those who are working for a living are engaged in agricultural pursuits and they receive thirteen and eight-tenths per cent of the national income." In one way or another the comparisons of income illustrate the subordination of agriculture.² It will suffice to give as illustration two comparisons: one between farm income and total income and one between farm earnings and corporation earnings.³ These data are given in Table 27 and Table 28 (p. 328).

These figures are presented not with the view of suggesting that farmers in the corn belt accept them at their face value as approximate measurement of reward for effort in gainful occupations in country and town. But

also, C. O. Hardy, "Recent Economic Changes in the United States," *Journal of Political Economy*, April 1930, XXXVIII, 222-27. See also L. H. Bean, "Effects of Production and the 1930 Business Depression on Farm Income," *Journal of Farm Economics*, October 1931, XIII, 535-46.

¹ "The Farm Problem," *Economic Geography*, October 1929, V, 358.

² L. H. Bean (of the United States Department of Agriculture) testified at a hearing of the Interstate Commerce Commission in Chicago on September 1, 1931, that a study of 6,000 farmers indicated an income available for operator's capital, labor, and management of \$862 in 1924 and \$598 in 1930.

³ See Appendix Table XIV for a tabulation of gross value of farm production and gross income.

farmers do believe that they indicate trends—a trend of expanding urban income and a trend of farm income either stationary or but slowly expanding. The figures would need to be corrected for relative rates of growth of farm population and population outside of farms, but such correction would not significantly modify them. The

TABLE 27.—COMPARISON OF ENTIRE REALIZED INCOME OF PEOPLE OF THE UNITED STATES WITH GROSS INCOME FROM FARM PRODUCTION, 1920-31*
(Million dollars)

Year	Entire realized income of people of United States	Gross income from farm production
1920.....	73,999	12,911
1921.....	63,371	8,717
1922.....	65,925	9,661
1923.....	74,337	10,787
1924.....	77,135	11,337
1925.....	81,931	11,968
1926.....	85,548	11,480
1927.....	88,205	11,616
1928.....	89,419	11,741
1929.....	.....	11,911
1930.....	.....	9,347
1931.....	.....	6,920

* Data for realized income from National Bureau of Economic Research, *News-Bulletin*, November 8, 1929, p. 2, and December 16, 1929, p. 1; gross farm income from *Crops and Markets*, September 1931, VIII, 397.

average farmer is inclined to generalize his particular case to cover all agriculture. Witnessing a high scale of urban expenditure, he infers that a corresponding scale of urban income is implied. Such figures as those presented in the tables above support the impression that the relative earning power of gainful occupation on the land is much lower than that in the town. To what extent farmers have revised their appraisal of urban prosperity

TABLE 28.—COMPARISON OF CORPORATION EARNINGS WITH NET EARNINGS OF AGRICULTURE IN THE UNITED STATES, 1922-30*

(Million dollars)

Calendar year	Corporation earnings	Crop year	Net earnings of agriculture
1922.....	5,100	1922-23.....	2,014
1923.....	6,700	1923-24.....	2,097
1924.....	5,900	1924-25.....	2,656
1925.....	8,100	1925-26.....	3,082
1926.....	8,200	1926-27.....	2,491
1927.....	7,700	1927-28.....	2,716
1928.....	8,500	1928-29.....	2,754
1929.....	9,700	1929-30.....	2,750*

* Arranged from data given in *Wallaces' Farmer*, January 25, 1930, p. 7.

* Estimated by Food Research Institute for purposes of comparison.

with the occurrence of the recent business depression can only be conjectured.

It is important to have a clear idea of what is to be understood by "technological unemployment" in agriculture. Where an advance in method enables three men to do work which required five men previously, with an unchanged outturn, the two men whose services have been rendered superfluous in the task under consideration become unemployed and must seek employment in some other occupation. Granting the implication that an expanding state of society takes care of such unemployment, it still remains a matter of common experience that the absorption of such unemployed individuals suffers a lag in time, is made difficult by geographic relations, and implies the sacrifice of training in one line and the acquirement of training in another. Whether an industry resists technical improvement and clings to its unreduced working forces with a low outturn per man, or accepts the improvements and lets the superfluous working forces go and secures a high outturn per man, in each case a social problem develops. If agriculture, with a relatively limited outlet in available markets, accepts technical improvements,

in each year this renders dispensable farmers who were in the previous year indispensable. If agriculture rejects the technical improvements and remains stationary in its methods, this course will be followed by stationary or declining income per man.

During the past thirty years, striking improvements have occurred in agricultural technique in the corn belt. For corn, these include improvement in strains, selection of seed, plowing, planting of seed, cultivation of growing crop, drainage, harvesting, grading, storing, and marketing of the crop. For hogs, the advances include improvement in strains, selection, fecundity, protection from and cure of diseases, housing, feeding, and marketing. Applied conjointly, these improvements during thirty years represent possibly a potential advance of a hundred per cent in outturn per man. The potential advances have not been fully realized in practice, of course; but it still remains true that the increased productivity per man has been quite as significant during the past three decades as increased productivity per man in urban industry.

Now the effect of these technical improvements is not to be observed in any change in the size of the farm in the corn belt. Let us take the three central states as illustration, namely, Indiana, Illinois, and Iowa. In 1900 the average size of the farm in these three states was 124.5 acres; in 1910 it was 128.2 acres; in 1920 it was 131.9 acres; and in 1930 it was 138.1 acres. Of course, there have been other factors modifying the size of farms. Also, the average size of the farm family has declined during these thirty years, and there is less employment of women and children in farm operations. But with all qualifications, it still remains a striking phenomenon that the size of the plant has been but slightly changed, despite an enormous improvement in the mechanization of the plant.

It strikes us this must be interpreted along the line of technological unemployment. Some farmers have left the

country without being replaced by other farmers, and many farmers' sons have deserted agriculture. But, by and large, the remaining farmers must be only partly employed when judged by the potential outturn per man. If the farmer uses these potential improvements, the average farm is much too small. If he does not use them, he falls behind the times, and must expect to receive a lower return for an employment involving lesser skill. The farmers of the corn belt have thus faced a dilemma which has become more acute with continuing expansion in the urban scale of living and has a distinct bearing on farm income.

SUMMARY: MAJOR CAUSES OF DIFFICULTIES

The post-war distress in the corn belt developed during the crop year 1920-21. For the corn crops of 1918 and 1919 the weighted average farm price was over 150 cents per bushel; but for the crop of 1920 the farm price fell to 62.1 cents and then to 54.3 cents for the crop of 1921. This was very hard on cash corn raisers. The farm price of hogs for the hog year 1918-19 was reported as \$16.60 per hundred pounds and held as high as \$13.43 for the year 1919-20. But for the year 1920-21 the price fell to \$8.52 and declined further to \$8.10 for the crop of 1921-22. This was a burden on farmers who sold their corn in the form of hogs and were also keyed up in hog production. A sharp decline in cattle prices occurred during the year beginning August 1, 1920. Land values declined a little later than corn and hog prices, but descended rapidly during the fiscal year 1921-22. On the basis of corn prices, farmers calculated that they lost money on their hogs during 1918, then gained for the first third of 1919, then lost heavily until the autumn of 1920, then recovered until early in 1923, then lost continuously until the second half of 1925, then recovered until the middle of 1927, finally losing again, except for occasional months, until the pres-

ent time. During 1927-30, when farmers felt they were losing on their hog prices, some were gaining on their cattle prices. This, of course, was all relative to the corn prices; if the corn prices had been satisfactory, the stated interpretations of the hog prices followed. But the corn prices, that were the yardstick for the hog prices, were most of the time below the level regarded as remunerative. The purchasing power of corn and hogs was continuously lower than before the war.

There is a distinction between agricultural distress and farming without remuneration. There was real distress in the corn belt during 1921-24, to a large extent in the nature of an emergency. From 1925 to 1929 the average farmer in the corn belt was getting along, holding his own in the operative sense; but he was then farming without remuneration, or with low remuneration, as judged by investment return and labor return. Conditions have further deteriorated since 1929, and especially during the crop years 1930-31 and 1931-32. Farmers in the corn belt have come to believe that this situation is inherent in the present relations of agriculture to industry.

The broad inferences to be drawn from the foregoing appraisals of values of corn and hog crops, corn and hog prices, costs of raising corn and hogs, freight rates on corn and hogs, increase in mortgages and interest charges, increase in taxes, and decline in land values in the corn belt indicate a relative reduction in remuneration since the war. Corn-belt opinion holds the deterioration to have been both relative and absolute. The effects of heavier taxes and interest charges, higher wages for hired farm labor, and higher prices for consumers' goods have combined to make the net position of corn growers and hog raisers in the corn belt (corn and hog prices considered constant) substantially lower during 1921-31 than during the five years before the war. The purchasing power of the crops of the corn belt was heavily reduced;

the purchasing power of the land value was heavily reduced. Thus, two kinds of distress appeared—distress due to low purchasing power of crops and distress due to debt. This does not imply that the pre-war position is to be regarded as a norm. Appraised for itself, the position just before the war may have been relatively satisfactory or unsatisfactory; we have not tried to appraise it,¹ but corn-belt opinion regarded it as the best since the Civil War. But however it was rated, the situation during 1921–31 cannot be regarded otherwise than as one of substantial deterioration. The exact position is not measurable. The trend through 1931–40 is expected to be in the direction of improvement, but farmers feel that recovery is slow and restoration long deferred.

From this follows the implication that on the average there has been an annual deficit, judged by the comparable level of pre-war returns. This deficit naturally varies: for some farms it means a decline from high profit to moderate profit, for others a decline from moderate profit to small profit, for others a transfer from small profit to small loss, and for others a worsening from small loss to heavy loss. It is not possible to compute an average to express the change in position; but whatever the extent of change, the corn belt farmer interprets the meaning for the present and the future quite as much from the viewpoint of the value of land as from the viewpoint of current farm accounts. Crop-price decline is regarded as primary, land-value decline as secondary; recovery of crop prices must precede recovery of land values, and recovery of land values is regarded as essential.

The farmers in the corn belt have come to realize that they suffer from technological unemployment. The term sounds rather "highfalutin," but the fact it designates is commonplace enough. The technique and outturn of

¹ On this point see J. D. Black, *Agricultural Reform in the United States*, pp. 33–34.

farming have outrun the markets. If the forces are reduced, as in the case of workers in an industry into which a new method or machine has entered, farm facilities stand unused. If the forces are maintained and labor-saving and area-handling implements utilized, the surplus is exaggerated. Mechanization tends toward part-time employment of the farm family and the children leave the farm. At the worst, technological unemployment results in withdrawal of farmers. If two-thirds of the present number of families in the corn belt can operate the farms, where is the unemployed third to go? Internally appraised, technological unemployment is therefore quite as clear-cut a progression in corn-belt agriculture as it is in mining and lumbering.

The gist of the case of the corn belt may be stated in one paragraph. The American plane of living is being expanded and elevated by social developments. The prices of the goods and services included therein are high, farm taxes and interest charges are high, expenses in operating the farm are high; but the prices of corn and hogs are low, or, if somewhat elevated, are not high enough to compensate for the costs of farming and living. When the farmer who is dissatisfied with the disparity between intake and outgo undertakes to sell out and retire, he finds the value of his property depreciated to the pre-war level and sometimes practically salable only on an auction basis. Farmers who own farms clear of mortgage debt are in better position than farmers working under mortgage debt, by the extent of the interest charges. Farmers who had accumulated savings find them reduced, or wiped out, by the failure of banks and default of mortgages. Farmers are reduced to operative returns, and these seem unattainable, or incommensurate, under the current levels of costs and prices.

This deterioration represents the farm distress in the corn belt. Practical significance lies in the cumulative

effect of a large number of factors, some interrelated but some unrelated. Enough has been said to indicate that it has many causes and includes many associated factors. For reasons that are partly political and partly sociological, an outstanding prominence in the discussion has been accorded to low farm prices of farm products and high farm prices of goods and services used on the farm.¹ Low selling prices and high buying prices mean disproportionate reduction in the purchasing power of farm products; farmers fail to make both ends meet.

The cause of low selling prices of corn and hogs has come to be sought in low world prices for corn and hogs. With a surplus of corn and hogs to be disposed of on world markets, many farmers have become convinced that export prices determine the prices for which the entire crops must be sold. This is the gist of the current doctrine of surplus control: that surplus is inevitable, that the world price determines the farm price, that the world price is below American standards, and agricultural distress is therefore primarily and chiefly the reflection of low world price.

It seems to be the view of the corn belt that the function of the protective tariff is to raise the price of the protected article and keep it above the world price by the amount of the duty. It is assumed that all domestic prices of goods enjoying protection are thus raised when the tariff is effective. If domestic prices are not so elevated, then the tariff is ineffective. From this consideration emerges the demand that the tariff be made effective for agricultural products as it is believed to be effective for manufactures. Since it is assumed that the tariff is directly effective on domestic prices of manufactures even when such goods are exported, but not correspondingly effective in the case of farm products, some way must

¹ This is commonly expressed in the political phrase that the farmer buys in a protected market and sells in a free market.

be devised to make tariff duties correspondingly effective on the prices of farm products. It is assumed that the world price, plus what is regarded as an attainable addition secured through an effective protective tariff, would represent a remunerative domestic price of farm products.

The argument now being advanced in favor of "making the tariff effective for agriculture" carries with it the inference (or even predication) that the customary and routine operation of the protective tariff brings about a double standard of value of merchandise, a higher price level at home, and a lower price level abroad. When, in the predicated operation of projected measures for farm relief, the exportable surplus of the crop is to be disposed of abroad at the world price and the fraction of the crop domestically consumed sold at a higher price level, it is implied that the corresponding occurrence already holds for manufactures.

Speaking on the question as to whether or not protective duties raise the general price level, J. D. Black¹ makes the following comment:

.... The generally accepted statement is that prices of export goods do not have their prices raised, that domestic deficit goods do, that purely domestic goods (not entering into foreign trade) also do, and that, as a result, the average price level, the cost of living, and wages are all placed on a higher level.

Later Black develops the argument that the duty will be added to the otherwise c.i.f. price, provided the country is regularly importing the article, and then passed on to consumers with increasing price increments. Since the services in distribution are regarded as compounded and recomounded as the article passes through one middleman after another from the original importer to the final retailer, it is thereby implied that a protective duty tends to raise the retail price of the imported article by more

¹ *Agricultural Reform in the United States*, pp. 183-84.

than the sum of the duty. It is predicated that the corresponding domestic article is sold at the same retail price as the imported article. After this fashion it is urged that the protective tariff increases middlemen's profits, as well as those of manufacturers, on both domestic and foreign goods.

In short, the farmers in the corn belt hold the belief that the protective tariff, when effective as in the case of manufactures, raises consumers' prices of imported goods and maintains on the same level the consumers' prices of the corresponding domestic goods. At the same time it is believed that American manufacturers customarily sell (in certain amounts) the same goods abroad at a lower price, in competition with the foreign goods against which the American manufacturers are protected in the home market by the tariff. That is, manufacturers operate on a double standard of prices. Farmers quite generally ascribe the prosperity of urban industry to the protective tariff and to restriction of immigration. They recognize that industry has greatly improved in efficiency, but they believe agriculture has improved equally in efficiency. In both cases the restriction of immigration favors mechanization. Thus, the determinative variable is held to lie in the action of the tariff, which is regarded as effective for industry but ineffective for agriculture.

We feel that the foregoing pages present a fair statement of the case for the complainant in the corn belt. There may be bias in the statistical data, but we do not think there is bias in the interpretation. We do not regard it as biased to use as the base-line the 5-year period before the war, which is commonly regarded as presenting the most favorable relation of agriculture to industry in modern times. We have endeavored to include consideration of all factors contributing to the depreciation. Regarding farmers in the corn belt not as an average but

as a range, we have endeavored to reflect what appears to be representative opinion of established farmers, while still according attention to the views of the youngest and of the oldest, of the poorest and of the best. Farm distress in the corn belt is not a strictly statistical state of affairs. More is involved than the commercial interests of farmers. Rural living and civic progress are involved.

The experiences of 1930 and 1931 have not served to change the attitude of farmers in the corn belt. In one respect there is a striking shift, in that the country towns have lost the prosperity which during the years previous to 1930 provoked the demand for equality of agriculture with industry. The high artisan wage rate and annual income, with which the farmer contrasted his labor income, has ceased to furnish so striking a contrast. Nevertheless, the essential discrimination remains, in the view of farmers. What was sought was not equality by making the towns unprosperous. Also, the business depression is not confined to the towns. Farm income during the crop year 1930-31 was very low, probably the lowest since the war. Farm income would have been lower had it not been subsidized; direct action in the case of wheat and indirect action in the case of other crops have served to increase farm income. There has been some reduction in the retail prices of the goods and services used on the farm, but farmers do not find these reductions equivalent to the declines in prices received for farm products. The low prices received for butter and eggs have been particularly severe on the farm income of the corn belt. Finally, the farmer hears on every hand that the towns are in the depression phase of a business cycle, that within a year or two prosperity will return. At the same time, he hears the echoes of the rumor from world centers of finance that a further trend of price decline is under way. In short, the farmer in the corn belt is inclined to make the interpretation that the present hard times represent only

a temporary break in the prosperity of the urban population but a progression in agricultural distress. The very low prices in prospect for 1931-32 tend to confirm his forebodings.

Every complex situation contains numerous elements, and exaggeration of the influence of one factor is to be studiously avoided. Also, elements of intellectual disposition as well as statistical data enter into opinions. Perhaps the most pressing question in the autumn of 1931 was the following: Has the price decline of raw materials been solely cyclical or secular as well as cyclical? If the price decline has been solely cyclical, certain expectations are justified in the period of recovery; but if secular influences have also participated in the price decline, more limited expectations are to be entertained. Whatever the causation, the effect of change in price level has been outstanding. A significant expression of this fact was given by G. F. Warren in an address before the International Conference of Agricultural Economists (held at Cornell University, Ithaca, New York, August 18-29, 1930), as follows:

The most important factor now is discrepancy between farm and retail prices. Taxes are next in importance. Interest payments are distinctly secondary, but very important. . . . The overwhelmingly important cause of the agricultural depression is falling prices and consequent maladjustment between farm and retail prices. An agricultural depression is an inevitable result of a decline in the general price level.¹

A significant recognition of the disabilities inherent in the current price position of agricultural products is to be found in the report of the Macmillan Committee, as follows:

¹ G. F. Warren, "Causes and Probable Duration of the Agricultural Depression," *Proceedings of the Second International Conference of Agricultural Economists* (Menasha, Wisconsin, George Banta Publishing Company, 1930), p. 108.

We are emphatically of the opinion that, even if a further fall of wholesale prices [of the principal foodstuffs and raw materials] be avoided, their stabilisation at approximately the present level would be a serious disaster for all countries of the world alike; and that the avoidance of such an event should be a prime object of international statesmanship.

The losses which are now being incurred by nearly all categories of producers of average efficiency in nearly all countries of the world are an overwhelming proof that the fall of commodity prices has gone far beyond the substantial reduction which might be justified in the case of many important commodities by the increases in productive efficiency which have been achieved in recent years.¹

Our statement of the case of the farmer in the corn belt may be fittingly closed with a quotation illustrating the sentiment toward legislative farm relief. In the course of an address delivered by F. L. Garlock of the State Agricultural College of Iowa, before the United States Chamber of Commerce in May 1926, following an allusion to the long-term outlook for amelioration, stood this statement, which is as applicable in 1931 as it was in 1926.

Little consolation, however, is afforded by this outlook to the corn belt farmer whose income has dwindled, whose land has depreciated in value, and who is oppressed with debt and other sources of heavy expense. Being unable by his individual efforts to work out of the dilemma, and facing ruin if he has to wait for the improvements of the distant future, he has turned to the government for aid. Just what form is taken by government assistance is of little concern to him, but he wants help. He *believes* that other industries have been helped out of similar circumstances by the tariff and by guaranteed rates of earning on a capitalization which has not been illiberally calculated. Now that he is in hard circumstances, he sees no reason why the government should not immediately come to his assistance. The problems of government subsidy, of product valorization, and of any other functions of government in matters economic are to him of little import as compared to the urgent necessities of his own condition.

¹ Committee on Finance and Industry, *Report*, Cmd. 3897 (London, 1931), pp. 114-15.

PART II. AMELIORATION OF THE CONSEQUENCES
OF A SURPLUS OF CORN AND HOGS

GENERAL STATEMENT

In chapter v we arrived at the induction that the domestic price of hogs has been determined primarily and principally by relations of domestic supply and only secondarily by factors of demand. On the side of demand, variations in domestic demand for our hog products have greater price effect than variations in export demand. The price of corn is directly determined in the country. Any proposal to alleviate farm distress in the corn belt, in so far as this may be due to low prices of corn and hogs, must take primary account of the supplies of corn and hogs. And, furthermore, projects instituted to improve corn and hog prices ought to be designed with the view of avoiding sequential and subsequent expansion of supplies (especially high-cost) of corn and hogs. It is upon this background that proposals for farm relief must be discussed.

In order to comment on the several methods proposed for alleviation of farm distress in the corn belt, it will be advantageous to recapitulate the several factors involved in the agricultural depression in the corn belt, as farmers see them, of which factors the surplus, however prominent, is only one.

1. The average farm in the corn belt is too small to engage the full efforts of a family with the use of modern farm machinery and production methods. The plant is too small and the overhead too large to support the family on the desired scale of living.

2. In respect to current operations, the farmer finds that labor, taxes, building materials, new equipment, and upkeep of old equipment are high, that is, high relative to the general price level of farm products.

3. On the side of investment, owners whose farms are

under mortgage find their interest charges disproportionately high. For all owners, the decline in land values represents a book loss; whether this remains a paper loss or becomes an out-of-pocket loss depends on circumstances. For all owners, the decline in land values has made borrowing for constructive purposes difficult or impossible. Interest charges and losses on land values are in dollars and are not adjustable for change in the value of money.

4. Farmers find that the selling prices of corn and hogs have not risen to correspond to the change in the value of money. Farmers observe that the spreads between producers' prices of raw materials and the retail prices of the finished products are much wider than before the war, and wider by more than can be accounted for by the change in value of money. The farmer feels that he loses in the expansion of the spread between raw farm products and finished foodstuffs, and between (imported or domestic) raw industrial materials and finished commodities.

5. Regarding his customary standard of living, the farmer finds that the farm prices of the goods and services he desires have risen by more than the change in the value of money. The farm scale of living of 1913 costs more in 1931 compared with 1913 than is expressed in the relation between the dollar of 1913 and the dollar of 1931. Furthermore, the scale of living has expanded since 1913. From both points of view, therefore, the desired scale of living costs absolutely and relatively more now than it did in 1913.¹

Grouping these experiences, the farmers in the corn belt find operative costs and fixed charges too high, spread between raw materials and finished goods too wide, purchasing power of crops and land values too low.

¹ This disparity has been somewhat reduced during 1931 by decline in retail prices of finished goods.

The surplus of corn and hogs tends to reduce the gross cash income; irrespective of fixed charges, operative costs, and purchasing power of corn and hogs, the number of dollars secured is directly reduced by lower farm prices resulting from the continuous surplus. Corn production has not materially increased since the war; but exports have declined, domestic demand has declined, and the average crop has not yielded what are regarded as remunerative returns to growers. Hog raising has expanded considerably, whereas exports and domestic demand have not kept pace; it also has not yielded returns regarded as remunerative to farmers.

If the gross cash income from corn and hogs could be advanced high enough, farming in the corn belt might again become remunerative, despite high operative costs and high fixed charges. By what methods and to what extent, in terms of farm prices, is it practicable to increase gross cash income in the corn belt?¹ But if gross farm income from corn and hogs cannot be correspondingly elevated, then amelioration is to be secured only through reduction of fixed charges, lowering of operative costs per unit, and decline in prices of goods and services used on the farm. These relations have given rise to widespread agitation for relief measures designed not merely to remedy the existing situation but also to stabilize the position of corn growers and hog raisers in certain respects in which they have long been unstable.

We have concluded that at one point the reasoning on causation is not substantiated by the evidence. The values of the corn and hog crops have not been determined to a major extent by the prices of the export fractions. The domestic price of corn is determined primarily by domes-

¹"We reaffirm our stand that the prices of farm products must *somehow* be raised above the world level to the same degree that labor and industry are above that level."--Resolution of Iowa Farm Bureau Federation, January 1930. (Italics ours.)

tic factors; the farm price of corn is not sensibly depressed by the world price of corn, and is influenced only in a secondary way by changes in foreign prices of hog products. The domestic price of hogs is appreciably influenced by change in foreign demand, but this cannot be regarded as a major factor in the determination of hog prices in the United States.

For the amelioration of the consequences of the continuing surpluses of corn and hogs, two types of procedures have been proposed and remain under consideration. These we term internal and external methods of farm relief. Under "external methods" proposed, the equalization fee, the export debenture, farm allotment, and price stabilization have received the greatest attention. The equalization fee may be regarded as an American political invention. The export debenture represents a new version of an old idea that has been in operation in one form or another in different countries. The farm allotment plan is a project directly based on farm management under governmental supervision and control. The equalization fee, the export debenture, and the farm allotment plan have in common the objective of raising above the world price the price of the crop domestically consumed. Stabilization of prices is an outgrowth of experiences in co-operative marketing and aims to improve the gross return of a crop by centralized and efficient merchandising with the use of public funds, under governmental management.

The late W. J. Spillman¹ stated the problem tersely in the following question:

Would it be possible to apply sound economic principles in the construction of a plan that would add to the price of farm products in this country without affecting the world price, and without stimulating production in this country?

¹ *Balancing the Farm Output* (New York, Orange Judd Publishing Company, 1927), p. 81.

This applies to all the proposals which we have grouped under the heading of "external methods" of farm relief.

The immediate objective of the legislative plans put forward to "make the tariff effective for agriculture" is elevation of the domestic price without change in the world price. There can be no question that this immediate objective is technically attainable, with other things equal. The difficulties lie in the secondary influences and subsequent effects. Three possibilities are obviously open.

1. The first is that domestic production would not be changed, nor would changes occur in production outside of the United States, nor in the freedom of movement of international trade. The case of the proponent of the equalization fee, the export debenture, and the farm allotment plan rests on this assumption.

2. The second possibility is that domestic production might be reduced. Reduction in the domestic outturn, resulting in a lowering of the exportable surplus, would thus tend to a reduction in the international supply and increase in price outside of the United States. Elevation of price outside of the United States would stimulate production abroad both in net importing and net exporting countries. Such increase in production in foreign countries would tend in its turn to bring about a sequential decline in price. The final result might be the same price level as at the outset, with a larger scope of agriculture abroad and a smaller scope of agriculture in the United States.

3. The third possibility is that domestic production would be increased. Increase in domestic production would result in augmentation of the exportable surplus. Increase of American exports would enlarge the world supply and tend to lower prices abroad, both in net importing and net exporting countries. Lower prices abroad would tend to depress production, in so far as farm production was directly responsive to prices. But in so far

as several countries are in the extractive stage of development (especially Canada, Argentina, and Australia), where production is not immediately responsive to prices and costs, a lowering in world price would not effectuate a corresponding reduction in outturn outside of the United States. The net effect would probably be a lower price level outside of and in the United States as a consequence of increased participation by the United States in world trade.

Under "internal methods" are grouped the measures tending toward amelioration that spring from the farmers themselves, involving little or no national legislation. Stabilization of prices stands closest to the internal methods of amelioration and may, indeed, be regarded as a combination of the internal and external methods, including little legislation but extensive modifications in the technique and management of agriculture.

It is the well-being of agriculture which is to be achieved, not the size of agriculture. The internal methods of alleviation of agricultural distress envisage a contraction of agriculture, with elevation of remuneration; the external methods purport to achieve a high remuneration with an uncontracted or even expanded agriculture.

In what follows, the more extended space devoted to the equalization fee, as contrasted with that devoted to the export debenture and farm allotment, is not to be taken as measuring importance or practicability. If foreign experiences with export debentures or other form of export subsidy had been extensively drawn into the discussion, the treatment of this procedure would have been greatly enlarged.¹

¹ We are not convinced that interest in the equalization fee and the export debenture is historic. We expect them to be revived in the Seventy-second Congress and one of them pushed for passage. We take it that the enactment of the equalization fee or the export debenture would be vetoed by President Hoover, as the equalization fee was vetoed by President Coolidge. It would not occasion surprise to any observer of democracy to find such a bill passed over the Presi-

It will be advantageous in each case first to describe the procedures and devices that are comprehended under the equalization fee, the export debenture, farm allotment, and price stabilization, limiting ourselves to simple cases that illustrate clearly but adequately the theory of each plan proposed.

dential veto, sooner or later. We do not expect any legislative attention to be given to the farm allotment plan. In respect to price stabilization, the experiences with wheat and cotton under the Farm Board have been so disappointing to growers that it does not seem at all likely that this path of anticipated alleviation will be pursued further by Congress.

CHAPTER VIII

THE EQUALIZATION FEE

Statement of hypothesis—The equalization fee applied to corn: Levying the fee; Tactics and consequences of price raising; Effects on corn acreage; Effects on consumption; Summary—The equalization fee applied to hogs: Animal husbandry as a joint-product operation; Scope of operations in raising the price of hogs; Levying the fee; Agreement with pork packers; Price increases of the several hog products; Illustration of distribution of price increase over carcass; The equalization fee on lard and salt pork; Effects on production of hogs; Regional effects on production; Effects of higher price on consumption; International complications; Summary

STATEMENT OF HYPOTHESIS

The equalization fee¹ has been put forward as a plan for making the protective tariff effective on the domestic price in the case of a crop of which we regularly produce and export a surplus. Thus, the device is designed to raise the price level of the fraction of the crop consumed within the country, while permitting the exportable surplus to be marketed abroad at the lower world price. The equalization fee presupposes a protective tariff of adequate height, and it follows that the fee would be levied on the imported as well as on the domestic product. The essential plan of the device is simple in theory. The equalization fee would be collected (in the simplest case) on each unit of the crop marketed, and the monies pooled into an equalization fund. This equalization fund would be administered for the crop in question by a governmental organization, let us say by the Farm Board.

¹ For several reasons we shall give more attention to the equalization fee than to the other external methods for farm relief which have been proposed. We feel that its application to corn and hogs has not been presented in sufficient detail in public discussions. The export debenture has been more fully examined. Finally, to a considerable extent the appraisals to be placed on the working of the equalization fee apply also to the export debenture and the farm allotment plan, and having been stated for one need not be repeated for the others.

With the equalization fund as a working capital, the agencies under the Farm Board would enter the country markets, obtain control of the exportable surplus, and withhold it from terminal markets, later disposing of it in foreign countries at the world price. With the exportable surplus removed from current market operations, domestic buyers would bid the price up to a point determined by the height of the tariff wall, or until checked by substitution and recession of domestic consumption with rising price. Since, under such circumstances, the Farm Board would pay producers more for the exportable surplus than it could be sold for abroad, exports would be attended with losses. These losses would be paid out of the equalization fund. Thus, the fund would have two uses—that of a working fund and that of a reserve fund to cover export losses. So long as the fraction of the crop consumed at home is large contrasted with the fraction passing to export, the gain to producers on the total merchandised crop would be larger than the loss sustained on the exports. The net effect would be an increase in the weighted producers' price per unit for the merchandised crop, but not secured on the seed or on breeding stock or on the crop consumed on the farm. The increase in farm price would be passed on to consumers. Since the idea was first put forth in 1921, the equalization fee has been dressed up in different garments for political, regional, and other reasons, and to fit the device to crops of widely differing characteristics. It was the heart of the vetoed McNary-Haugen bills. The essential idea remains the same—the plan to raise the price level on the crop domestically consumed and dispose of the exportable surplus separately at a lower world price.

The equalization fee, therefore, is thus a device for the realization of a policy embodying three principal objectives. It is desired to raise the farm price of the agricultural commodity in question. When the domestic

price is thus raised behind the tariff wall, the export fraction must be sold at a loss. Since the producers of the crop in question receive higher domestic prices when protected from the world market, they should bear the export losses on their product. The equalization fee, imposed on growers, provides the capital fund for the operation, pays the losses on exports, and acts as a revolving fund for the marketing activities. *In particular, the device is designed to make the producing class that profits by the operation pay the contingent losses and costs of the operation.*

During the course of the discussions on the equalization fee, the supporters of this device have come to lay more and more emphasis on the self-imposed burden that each commodity must bear the costs of disposition of the exportable surplus. The proposition is sometimes stated in terms suggestive of immolation. The resolutions adopted by the so-called "Corn Belt Committee" were governed by the principle that the cost of dealing with surpluses should be distributed over the marketed commodity—a fundamental principle that costs and losses arising on sales in export be borne by the marketed units of the benefited commodity. If any agricultural group were self-contained, with full control over the crop, losses on exports would naturally be reflected back to members of the group. Since the scattered producers of grains and animals cannot be effectively incorporated into self-contained groups, the equalization fee was designed to accomplish the same result circuitously with governmental assistance. Regarding the equalization fee, therefore, as a device for effecting compulsory (if indirect) co-operative marketing, the growers under the equalization fee should bear the losses on exports, just as would the growers if they were a self-contained group. If the California Fruit Growers' Exchange happens to export oranges at a loss, or at a lesser profit than the returns on domestic sales, the loss is borne entirely by the members. The

equalization fee is designed to have losses on exports borne by the producers of those exports.

This may be viewed either as a proposition of class sentiment, of political policy, or of economics. It portrays the producers of a particular farm product as asking for governmental assistance in enabling the majority of the farmers raising the crop to compel all of the farmers raising the crop to carry their share of costs and losses. It is notorious that one of the chief difficulties in co-operative marketing is that the benefits accrue to non-members as well as to members, while the costs are carried only by members. There is widespread resentment over this situation, and rural support has been secured for the equalization fee because it promised to make all individual producers line up with the associated producers. It also promotes the sense of self-satisfaction for a group to announce that it desires no direct or indirect subsidy, but merely a legal implement enabling it, so to speak, to police all producers and compel them to bear their shares of a burden that rightfully belongs to the group. There are obviously engaging elements of class sentiment and political policy included in the doctrine of the equalization fee. One of these is the circumstance that the fee would bring about, in effect, compulsory co-operative marketing.

A general and on the whole friendly presentation of the equalization fee is to be found in *Agricultural Reform in the United States*, by John D. Black. A critical appraisal of the plan as applied to wheat (where the project would find its simplest application) is contained in a publication of the Food Research Institute entitled "The McNary-Haugen Plan as Applied to Wheat: Operating Problems and Economic Consequences."¹

¹ WHEAT STUDIES OF THE FOOD RESEARCH INSTITUTE, FEBRUARY 1927, Vol. III, No. 4.

We are not here called on to determine whether the equalization fee is a regulation of interstate commerce or an excise tax. Whether it is price fixing is beside the mark. To us, condemnation would not follow *ipso facto* if the plan were price fixing nor vindication be correspondingly secured if it were not price fixing. Our interest in the equalization fee as applied to corn and hogs involves its agricultural import, and may be stated in three questions:

1. Would the equalization fee, behind a fully protective tariff wall, enable the farm prices of corn and hogs to be substantially raised, while permitting the exportable surplus to continue to be sold abroad?

2. If the farm price of corn and hogs were notably elevated through the operations of the equalization fee, would this stimulate the production of corn and hogs?

3. If the production of corn and hogs were expanded in consequence of the operations of the equalization fee, what would be the effect of the increased supplies upon terminal prices abroad and at home, and secondarily upon domestic farm prices of corn and hogs?

THE EQUALIZATION FEE APPLIED TO CORN

Let us consider, first as a problem in merchandising, the plan to raise and stabilize the cash price of corn by means of the equalization fee under the operations of a Farm Board and a corn-trading corporation representing co-operative associations. Under the theory of the plan, the Farm Board would levy an equalization fee to apply to growers, primarily to provide working capital for the Corn Corporation and to cover losses on exports; the price of corn sold for domestic use behind the tariff wall would then rise above the price on the world market on which the export corn would be sold; the gain on the corn domestically consumed would outweigh the loss on the corn exported.

LEVYING THE FEE

It has been regarded as necessary to have an equalization fee levied on corn in order to have growers of corn for cash sale carry losses incurred in the export of corn as grain or corn products. This implies a segregation of cash corn from feed corn, so that the loss on export of corn would be carried by farmers who market cash corn, through application of an equalization fee on corn, while the loss on export of hog products would be carried by farmers who market corn in hogs, through application of an equalization fee on hogs.

The undertaking to levy an equalization fee on corn would encounter highly complex administrative difficulties. No fee could be collected on corn sold from farm to farm; also, to levy a fee on all corn leaving the farm, or leaving the county where grown, would be impracticable. To collect the fee on railway bills of lading seems the only practicable way of levying an equalization fee on corn. With the fee applied only to shipments by rail, widespread "bootlegging" in corn would occur over highways. But it is assumed that growers who escaped the fee by selling corn without paying the fee (or by selling no corn) would be reached by the fee applied to hogs.

Since the weighted price of cash corn is not nowadays sensibly depressed by the world price of corn, merely to cover trifling losses on the small corn exports with an equalization fee would accomplish nothing worth while. A higher price for cash corn would mean enhanced costs for farmers who buy corn to finish feeder stock; for the farmer who feeds the corn he raises, it would merely alter his paper corn-hog ratio. What is really wanted is some procedure for raising the cash price of corn for all uses *outside of animal husbandry*. If the price level could be raised for all corn used for feeding work animals in cities, ground for human consumption, and employed in corn-products factories, and not otherwise influenced, this

would avoid burdening the users of corn on farms and in the production of animals for market. It may not seem practicable to raise the price of corn for urban buyers and not for country buyers, but that is what ought to be aimed at under the plan.

In order to raise the price of corn at all, it would be necessary, behind the tariff wall, to purchase and store corn in such amounts as to influence the market. Just as a Wheat Corporation could not be expected to raise the price of wheat behind a tariff wall without purchasing the exportable surplus and enough more of the crop to control marketing, so the cash price of corn could not be raised without buying enough corn to influence market movements. How much corn would need to be purchased, no one could foretell; it would vary from season to season. It would be necessary to restrict the visible supply and to control shipments to and from and receipts at the primary markets. Bidding up the cash price of corn at terminals would tempt farmers to increase the marketing of cash corn and to feed less. The Corn Corporation would run the danger of finding on its hands at the end of the season a carryover (outside of farms) excessive for the crop. Although the final objective of the total operation would be the same for corn sold for cash and corn fed to hogs, in practice they might be found to be competitive, since driving up the price of cash corn would alter the corn-hog ratio by which most farmers decide how much to feed. The implication is that in most years little could be done to raise the price of corn merely by working on the price end; nothing can help the corn price much except so to reduce the supply that corn does not go searching for animals to consume it. Since the largest part of the cash corn crop is raised in two regions, the fee could hardly be of widespread application. However applied to cash corn, the fee would introduce complications into feeding operations and would not apply equally,

in respect of corn acreage or crop, to all farmers in any region, or between regions. It does not seem possible to consider the levy of the fee outside of the corn belt.

Obviously, the application of the equalization fee to corn bristles with difficulties. The small proportion of corn marketed for cash makes the application of the fee, rather paradoxically, not less but more difficult. Under these circumstances, some farseeing proponents of the legislation have opposed the application of the equalization fee to corn, relying on improvement in the price of hogs (sought through an equalization fee on hogs) indirectly to improve the position of corn.¹ From the standpoint of the workability of the scheme, this may be a sound position; but dialectically it seems to be regarded as a sign of weakness to concede that the device regarded as so indispensable to price increase as the equalization fee is inapplicable to the largest American crop. Also, whether desirable in itself or not, so long as an equalization fee is imposed on hogs, it may be regarded as administratively necessary also on corn, in order to enable the Farm Board to influence the corn-hog ratio. The cash price of corn is a lesser problem; the product price of corn is the main problem: the chief product price of corn is the price of hogs. As will be indicated later, bilateral control of corn and hog crops represents the crux of the operation.

It is commonly urged that all crops require equalization with industry and that the equalization fee is applicable to all crops. Oats and barley bring little return to growers; yet no one seems seriously to contemplate applying the scheme to oats, barley, and other coarse grains. The hope has been expressed that application of the equalization fee to wheat would tend to raise the price of millfeed, which would tend to improve the prices of corn,

¹ Cf. editorial in *Wallaces' Farmer*, June 1, 1928, p. 4.

oats, and barley; also, if successfully applied to corn, this would tend to improve the prices of oats and barley. We have elsewhere¹ expressed the view that if the equalization fee were successfully applied to wheat the price increase would be passed on to flour and not to millfeed. From the standpoint of the intelligent application of the hypothesis itself, marketing under the equalization fee does not lend itself well to feed grains because of their varied joint-product relations. From the standpoint of the proponents, the most logical procedure, though a limited one, would seem to be to impose equalization fees on corn, barley, and oats entering into urban consumption and into manufactures.

THE TACTICS AND CONSEQUENCES OF PRICE RAISING

Suppose, now, a Farm Board, intent on raising the price of cash corn behind the tariff wall, in conjunction with a Corn Corporation should (a) levy an equalization fee on corn delivered to railways, boats, and barges for shipment, (b) purchase enough cash corn in the various terminal markets to become an effective factor in the market, and (c) proceed thereafter to drive up the price of cash corn by restraining the flow, controlling the visible stocks, and holding up the prices of the corn in the hands of the Corporation. This policy would require heavy purchases, in some years at least, in the regions that raise much corn for cash sale, and also possibly in the feeding sections. The Corn Corporation might need to acquire and hold a large part of the merchandised corn supply, in order continuously to give to the market the complexion of a "seller's market." Since 1921-22 the largest visible supply in any month was 47 million bushels (in April 1927), and the largest annual receipts at the

¹ "The McNary-Haugen Plan as Applied to Wheat: Operating Problems and Economic Consequences," *WHEAT STUDIES OF THE FOOD RESEARCH INSTITUTE*, February 1927, III, 215-16.

ten primary markets were 290 million bushels (in 1927-28).¹ Judging by the experiences of the Canadian Wheat Pool and the Grain Stabilization Corporation, the Corn Corporation would find it necessary also to buy and sell corn futures in the interest of higher prices.

The first farm reaction to such a policy would be a tendency to increase the marketing of cash corn. The merchandisable crop would be more completely cleaned up in the cash-corn areas; also, more corn would be shipped out of more distant regions, because the higher cash-corn price and the policy of higher corn price would induce some farmers throughout the corn belt to expand their cash sales. Since the Farm Board would at the same time be engaged in raising the price of live hogs, however, increased marketing of cash corn might not eventuate, since the promulgated hog prices might appear even more attractive—though the immediate cash corn price would be a bird in the hand and the hog price a year later would be a bird in the bush. With higher price of cash corn, farmers would incline to feed more oats and barley and less corn, just the opposite of what corn raisers desire. The higher price of corn would make operations with feeder stock more expensive.

In cities the higher price of corn would tend to increase the use of oats and barley for horses. An artificially high terminal price for corn would tend to pull up the terminal prices of oats and barley; but there can be little question of an effect in the direction of substitution of corn with oats and barley. A higher corn price might reduce the volume of corn going into distillation and into the various manufactured corn products. Much would depend on the manner of promulgation of the policy of higher corn price and the extent of increase sought.

The action of the Corn Corporation would have no

¹ *Agricultural Yearbook, 1931*, pp. 622 and 624.

detering effect on exports of corn, since exporters would have to meet in Europe the price of Argentine, Balkan, and Russian maize, quality considered. Indeed, it is possible, by making export corn uniform in grade, water content, and quality, that exports to Europe might be enlarged. The Corn Corporation might enter upon deliberate export dumping of corn. Just how much money the Corporation might be prepared to lose on the export of corn would depend on the size of the equalization fund. From the standpoint of the carryover, it would be advantageous for the Corporation to set the equalization fee high, in order, if possible, to discourage shipments from the farm and at the same time to encourage exports.

With existing relations between volumes of domestic consumption and of export of corn, if the equalization fee raised the price of American corn substantially, the exported corn would be sold abroad at a significantly lower figure. This would tend relatively to favor the cost of raising hogs in Europe. But more important still, it would provide to farmers in Canada, especially Ontario, a relatively low-priced feedstuff. This would enable them to produce hog products and dairy products more cheaply than could be done in the United States, so far as this element of cost is concerned. The effect would be to improve the competitive position of the Canadian exporter of hog products to Europe and of dairy products to Europe and to the United States.

A higher tariff would be needed to prevent importation of corn. Argentine corn can be delivered cheaply to the Atlantic and Pacific seaboard. In terms of transportation, the Atlantic States are almost as far from the corn belt as from Argentina.¹ The daily price of corn in Argentina rests on the basis of the c.i.f. price for which it can be sold in Europe. Up to the present there have been but

¹ See map of regional prices of corn in *Agriculture Yearbook, 1921*, p. 210.

low imports of corn. But if a Corn Corporation were to adopt the policy of driving up the domestic price of corn, importation from Argentina during part of the year might become a going trade, facilitated by the availability of liner tonnage from Buenos Aires to North Atlantic ports. The states contiguous to Atlantic and Pacific ports have varying needs in excess of local production. Obviously, a tariff of 25 cents a bushel is not enough to give the Corn Corporation much scope in raising the domestic price of corn in a manner desired by corn producers.

After all, the project of raising the price of cash corn is really much ado about next to nothing. Control of hogs is the main thing. If higher prices on hogs could be secured, higher prices on cash corn would not yield much additional. If the scheme were a failure with hogs, the situation would not be saved by success with cash corn nor made much worse by failure with cash corn.

It would be to no purpose to enter upon a discussion of the form of organization that a Corn Corporation might undertake to develop for the purpose of raising the price of corn. The acreage of corn is distributed over a larger number of farms than is the case with any other important crop. The disproportion between corn grown and corn sold in itself suggests the futility of organizing corn growers' co-operative associations. Just as corn growers are less organizable than wheat growers, so commerce in corn, futures trading in corn, storage of corn, and milling of corn stand on a different basis than in the case of wheat. The marketing, distribution, and milling of corn remain poorly developed, from the standpoint of modern business methods. Because corn lends itself poorly both to horizontal and vertical integration, the difficulties of organization of a Corn Corporation and the intricacies of management in furtherance of a policy of price increase are obvious. From the levying of the equalization fee to the handling of the carryover, the tactics of the operation

would be a nation-wide experiment. Henry Wallace¹ has held that the equalization fee could be used to raise the producer's net price of hogs, but doubted whether any increase could be secured on cash corn. We agree with those proponents of the equalization fee who regard the equalization fee as unadapted to cash corn.²

EFFECTS ON CORN ACREAGE

What effect on corn acreage ought one to expect in the event of official promulgation of policy of higher cash corn price, with marketing designed to secure that price and the transfer to a Corn Corporation of the responsibility for export and carryover, with assumed stabilization throughout the season? In our view, the result would be increase of acreage and a consequent tendency to increase in crop.

Agricultural writers seem to have accustomed themselves to a general notion that we have only about 100 million acres of good corn land.³ This view may lie at the basis of the statement in the 1921 *Yearbook* (p. 219) of the United States Department of Agriculture that "the population of the United States has been increasing faster than corn production during recent years, and this has been an important factor in raising the price and purchasing power of corn." We are not disposed to dispute the historical truth of this statement; but it would be misleading to assume, because the trend of corn prices was upward for nearly two decades before the war, that a continuation of this trend is to be expected during the next decade. New developments worth mentioning again

¹ *Wallaces' Farmer*, April 20, 1928, p. 4.

² It is significant that J. D. Black in his discussion of the equalization fee (*Agricultural Reform in the United States*, pp. 232-54), makes no reference to corn.

³ Of this acreage, over 10 million acres are usually "hogged down" and over 4 million used for ensilage.

have put a different complexion on the situation. Prohibition has reduced the demand for corn and barley. Substitutes have largely replaced corn in the manufacture of alcohol. The decrease in work animals since 1918 has wiped out the market for some 6 million acres each of corn and oats and 8 million acres of hay. The number of acres of corn that a single individual can plant, cultivate, and harvest is being rapidly and greatly expanded by improvements in machinery. W. J. Spillman¹ has suggested that in 1924 there was a surplus acreage of 39 million acres for the major crops (including 6 million for corn), without considering barley and rye. Viewed in the aggregate, it seems impossible to doubt that 10 million acres might readily be shifted to corn under the stimulus of a high-price policy and better price.

Quite generally, the coarse grains are competitive in the planting program of farmers, though conjoined in a system of rotation varying from region to region. Quite generally, also, the disposition of oats, barley, and rye tends to form an unpromising commercial problem to the grower. With a policy of high corn price, corn would tend to replace other coarse grains, so far as established crop rotations would permit and even to the extent of disrupting rotations. This would be a return to extractive farming and lead to later reduction of soil fertility, especially in the cash-corn regions. At what price an additional corn acreage of 10 million acres could be remuneratively operated (for the time being) is another question; but that would not deter the expansion, just as low price has not eliminated corn acreage already unremuneratively cultivated.

Consider the effect to be expected in the different corn regions. The corn-deficiency states would have the incentive to raise more corn at higher price, in order to

¹ *Balancing the Farm Output*, pp. 42-43.

reduce purchases from outside; since higher corn price might also tend to lower consumption, this would imply that the corn-deficiency states would more nearly cover their corn requirements than on a lower price level. In those regions in the corn-surplus states where corn is largely marketed as a cash crop, the acreage would also tend to be increased, because corn is the prominent cash-income crop.

Consider the effect on individual farmers. The grower to whom the corn crop is a prominent item in cash income would find in a higher price a direct incentive to expansion of corn acreage. But, almost equally, the farmer who has to buy corn would increase his corn acreage in order to reduce his volume of purchases of corn, particularly in view of the comparatively unattractive returns of other feedstuffs in terms of nutrients per acre. Finally, the farmer whose farm output is approximately balanced between animals and feedstuffs would find an incentive for increased corn acreage with a higher price for corn, provided that a higher price for hogs were also established. If a Farm Board, desirous of restraining corn production in the event of higher cash-corn price, should counsel reduction of acreage, to whom should the exhortation be addressed? Could the same admonition be addressed to corn-deficiency states and to corn-surplus state, to corn-deficiency farmers and to corn-surplus farmers?

The truth of the matter is that we have for the time being an excessive acreage of corn, in view of the fact that the hog is the crucial factor in our corn problem. The gist of the situation was stated concisely in an editorial in *Wallaces' Farmer* on January 7, 1927 (p. 4): "The next thing to do is to adjust our corn acreage to the hogs To balance things up, we must now cut our corn acreage 10 or 15 per cent."

The objection is sometimes raised that high corn price

need not stimulate acreage; indeed, on the contrary, low price may stimulate acreage. No matter how paradoxically this is stated, the facts and the incentives are clear. A single year of high price or of low price need have no effect on acreage the next year. Low price sometimes stimulates planted acreage because the farmer must secure a minimum cash income to cover fixed charges and operating costs. High price tends to stimulate planted acreage because the farmer wishes to cash in on the favorable opportunity. With low price some farmers increase acreage to avoid deficit; with high price most farmers increase acreage to enlarge profits. A high cash price for corn and a high price for hogs both tend to stimulate corn acreage. If high prices, and prospect of high prices, did not stimulate corn planting and hog breeding, there would have been no such thing as the much discussed cycles of hogs and hog prices.

Finally, it ought to be realized that a trend toward higher price and an accepted policy of higher price would be expected to have a different influence on acreage than would be furnished by casual high price as the result of a short crop in a particular year. There is a great difference between a program of high price and an accident of high price. The effect of this distinction would be all the larger if the program of high price applied, so far as cereals are concerned, solely to corn (and inferentially to wheat) and not to rye, barley, oats, and the sorghum grains. It is of course categorically declared that equalization fees are applicable to all grains; but it has never been seriously proposed to apply them except to wheat and corn.

It has been urged that the stimulation to corn acreage that would result from the policy of high corn price would merely serve to check the decline in corn acreage now under way as the result of low price. This is special pleading that disregards the element of time. The per

capita acreage of corn tends to decline; the per capita consumption of corn tends to decline. These trends move slowly. Changes in the disposition of barley, oats, and rye, and to some extent of corn, have moved rapidly.¹ At some future time the population may catch up with the corn acreage. So long as Spillman² could estimate in 1927 a surplus of acreage of 39 million acres without including either rye or barley, it is far-fetched to plead that a higher corn price is necessary during the next few years to counteract a relative decline in corn acreage. Some day we may be seeking out land adapted to corn; but a decade hence we shall be still seeking higher prices for corn and other uses for land still in corn.

Finally, it is urged that the equalization fee on corn would tend to check increase of acreage. From the foregoing we find no reason to share this hope. The equalization fee would tend to check the planting of corn only if it failed to raise the price of corn. The farmer raising corn for sale would follow the trend of cash corn price; the farmer raising corn to feed would follow the trend of prices of hogs and cattle. The only effective restraint would lie in such control of hog breeding as would eliminate the hog cycle.

EFFECTS ON CONSUMPTION

Owing to lack of appropriate information on the milling of corn and the manufacture of other edible corn products, the opinion one may hazard as to the effect of higher price of corn on consumption remains an inference based on general considerations. The consumption of corn for food is more than that of barley, oats, rye, and rice combined; it thus ranks next to wheat as the prominent cereal foodstuff. But corn, the staple cereal of the pio-

¹ L. J. Norton, "Some Recent Changes in Meat and Feed Crop Production," *Journal of Farm Economics*, July 1927, IX, 305-17.

² *Op. cit.*, p. 42.

neers in the North Atlantic States, has remained a staple cereal only in the South, and even there to a diminishing extent. For the country as a whole, the corn consumption is probably now a sixth of the wheat consumption, in terms of calories.¹

On the basis of the relative mill prices of wheat and corn and the costs of milling and merchandising wheat flour and corn meal, corn meal would be expected to be considerably cheaper than wheat flour, despite its greater perishability. This expectation does not seem to hold for the retail trade. The average country-wide corn-meal retail prices, as reported in the *Monthly Labor Review* of the United States Department of Labor, until 1928 were almost as high as the comparable prices of wheat flour. In September 1928, according to the *Monthly Labor Review*, the average retail prices of wheat flour and corn meal were the same (5.3 cents a pound). Since then the price of corn meal in many places has often been higher than that of wheat flour. In October 1931 the prices were respectively 4.4 and 3.3 cents a pound. The prices of corn meal have wider regional fluctuations than those of wheat flour. To what extent these prices are from time to time respectively modified following changes in the prices of the grains from which they are manufactured does not concern us here. It suffices to point out that at present corn meal, purchased at retail in American cities, tends to be more expensive than wheat flour.

Before the war, over considerable sections of the country, hard times increased the consumption of corn meal at the expense of wheat flour; in prosperous times, wheat gained at the expense of corn. This does not seem to hold in the present depression. Despite the varied uses of corn-starch, hominy, corn oil, corn breakfast foods, and other

¹ Cf. Holbrook Working, "The Decline in Per Capita Consumption of Flour in the United States," WHEAT STUDIES OF THE FOOD RESEARCH INSTITUTE, July 1926, II, 279.

special corn preparations, corn has limited dietary uses. Corn bread is more monotonous in the diet than wheaten bread; in addition, corn bread does not constitute as attractive a vehicle for spreading materials as does wheaten bread.

More important still, corn bread does not lend itself to bakery methods. It cannot be baked under conditions of mass production, wrapped, and delivered, like wheaten bread. Corn meal does not lend itself to the use of yeast, but must be prepared as a quick bread (with or without the addition of wheat flour, with or without the use of baking powder) in the household kitchen, or in kitchens of public eating-places. It does not lend itself to the manufacture of innumerable cakes and pastries as does wheat flour.

These considerations act as deterrents to consumption of corn meal in general and influence the reaction of the consuming public to changes in price. When corn is cheap, if people desire to consume more, this involves the inconvenience of additional baking in the home; when corn meal is high, if people desire to consume less, this is facilitated by the elimination of baking in the home. The quality of corn meal depends upon the soundness of the grain and the freshness of the product. Water-ground corn meal possesses a taste not to be found in degerminated corn flour. But water-ground corn meal, or fresh corn meal of any grinding, is not so readily obtainable that the supply can be expanded to take advantage of low price. On the other hand, standard corn meal is in no position to make any appeal at high price.

Increase in the price of corn would tend to increase the price of cornstarch, corn oil, and corn sugar. Cornstarch is so much cheaper than any other comparable industrial starch that a higher price of corn would hardly provoke the use of any substitute material; but a higher price for cornstarch might tend to restrict its use. Corn

oil competes with other vegetable oils on the basis of both quality and price, and if the price of corn oil were substantially increased, as the result of increase in the price of corn, this would tend to retard the expansion in the use of corn oil now under way. The expansion in use of corn sugar, under present regulations, and the effect of higher corn price on the price of glucose can only be surmised.

Under any circumstances, the principal reaction of consumers to changes in price of corn as a cereal food would occur in the Southern States. But with increasing industrialization in the South, preference veers from corn toward wheat. Increased price of corn would intensify this tendency. It does not seem likely, however, that any attainable increase in the price of corn would provoke a substantial reaction on the part of consumers. As in the case of wheat, though for somewhat different reasons, we feel that the American public would be practically indifferent to any probable change in the price of corn as a foodstuff. On the other hand, it seems equally clear that all attempts to increase consumption of corn products by drives and propaganda would prove unavailing to attain any sensible diminution of the surplus.

Increase in the price of corn would tend in some regions and under certain circumstances to restrict its use as a feedstuff. To some extent (in particular, aside from beef cattle and hogs, but even including them in some regions) corn can be replaced as a feedstuff by rye, barley, and oats. Also, gluten feed and hominy feed (concentrates made out of corn) compete with millfeeds, linseed and cottonseed meal, and alfalfa meal, and their use would be restricted at relative increase of price of corn. Finally, at a higher price of corn, under certain circumstances, less corn is fed to cattle and hogs and the animals are marketed at lower weights, to which reference was made above. In short, increase in the price of

corn would tend toward reduction in use, but the extent cannot be guessed at.

SUMMARY

The equalization fee is designed to increase the weighted farm price of cash corn. The fee could be effectively levied only on corn in transit—on rails, boats, and barges. One cannot estimate upon what proportion of the crop shipped out of the county where grown the fee could be collected. A higher tariff on corn would be necessary to make the fee workable. The need of the equalization fee for covering the losses on current exports of corn would be small. An equalization fee effective for cash corn implies an equalization fee on hogs equally effective in corn equivalent. To apply the fee to corn and not to the other coarse grains would provoke obvious difficulties.

To raise the weighted price of cash corn with the use of the equalization fee would necessitate a Corn Corporation in effective control of the merchandised crop and of the market. This Corporation would also need to be predominant in the export trade. Not only would the Corporation need to exercise a control on the movement and disposition of cash corn, it would need to restrain the volume of corn leaving the county where grown. This implies that the policy of the Corn Corporation would be conjoined with a dovetailed policy of a Hog Corporation.

Increase in the price of cash corn over several seasons, and, in particular, increase in the price of cash corn under a program of higher price for corn, would result in an increase in acreage planted to corn. This increase in area would come largely in regions known to be adapted to corn, and would include some new land, but for the most part presumably would be land taken from other crops whose prices would be made to appear less attractive

than the price of corn under an official program of higher corn price.

Any practicable increase in the price of cash corn would hardly tend to diminish the use of corn as a food-stuff, but would tend to diminish the use of corn as industrial raw material and as a feedstuff. The increase in corn acreage would tend to defeat the objective of the equalization fee on corn. We see little reason to infer that paying the equalization fee would have a restraining effect on corn acreage. All in all, we see no practical possibility of applying the equalization fee to corn at all. If the price of corn is to be improved from the side of disposition, this must be approached indirectly rather than directly. The task will fall upon animal husbandmen.

THE EQUALIZATION FEE APPLIED TO HOGS

In chapter v we reached the conclusion that the determination of hog prices depended largely on domestic factors; in domestic circumstances are to be sought, for the most part, the influences that have resulted in low prices of hogs. On this basis, we reached the inference that amelioration of the distress of corn growers must be sought through the major fraction of the crop passing into animals, rather than through efforts to increase the price of cash corn.

The equalization fee has received widespread attention in respect to hogs. How would a fee be levied? How would the equalization fund be applied to losses on exports? How would the operation be administered? What are the prospects for increasing the price of hog products? What would be the effect on production of hogs? How would higher prices influence consumption? Before approaching these questions, it is relevant to describe animal husbandry in the corn belt as a joint-product operation, since this has a direct bearing upon most questions a Farm Board would have to face.

ANIMAL HUSBANDRY AS A JOINT-PRODUCT OPERATION

Let us first contrast grains and animals. The conversion of wheat into retail end-products is relatively simple. Over two-thirds of the raw material comes out in the form of one chief product—flour; less than one-third comes out as three by-products—screenings, millfeed, and low-grade clears. Despite differences in varieties of wheat between regions and from year to year within regions, milling skill in blending wheats in the manufacture of flour is such, with full consideration of the several grades of flour made throughout the country (straight, bakers' patent, long patent, short patent, family patent), that flour may be considered as something approaching a merchandise unity. The screenings, millfeed, and clears are sold for what they will fetch and the burden of the costs (raw material, overhead, manufacturing charges, and selling costs) falls on the flour, distributed somewhat differently over various grades from year to year and from region to region. Occasionally, the by-products may be sold to unusual advantage. But practically speaking, flour carries the burden of the business; the price of flour is the determining factor in the accounting of the total operation.

In the case of feed grains and animal products, on the other hand, instead of relative simplicity we have most entangled complexity. In this country, corn and oats are intricately involved with cattle and hogs. Hogs are largely a corn product, though of course breeding stock and growing pigs require forage crops, and concentrates and other seeds than corn are important feedstuffs. Half of the corn crop goes into hogs, but we do not know what proportion of the weight of the slaughtered hog is derived from corn. The corn marketed in cattle is declining. Oats compete with corn as a feedstuff for cattle, hogs, and especially horses. There has been a large cash market for oats as feed for horses outside of farms, but this

is declining with the increase in automobiles; therefore, the oat crop tends to become continuously less remunerative and has assumed almost the position of a necessary evil as a rotation crop for corn. Accordingly, though only a moderate amount of oats is fed to swine and cattle, oats are involved in the complex because oats are inseparable from corn.

There are many grades of cattle of many breeds going to market in each region, with wide variations between regions—calves, old dairy cows, range stock, farm cows, and steers and heifers of all ages and qualities, grass-fed and corn-fed. Feeder steers appear in stockyards alongside of steers for slaughter. The range of prices from the top to the bottom may be over 10 cents a pound.¹ The market for each type and quality is limited by one or another consideration. The slaughterhouses market cattle largely as sides and quarters,² and these, with the hide, are the chief products; this leaves the head and neck, bones, extremities, trimmings, tallow, and viscera to be disposed of for what they will fetch. Younger and leaner steers are preferred over older and fatter steers. The choice animals carry part of the burden of poorer animals—i.e., the carcasses of choice animals must be sold for relatively more than comparative cost. Within each class are differences in prices between hind and front quarters. Within each quarter are sharp differences in prices between cuts; these differences appear with the retailers, rather than with the slaughterers, except in so far as the latter may be engaged in wholesaling cuts or in retailing. Between the lean and the fat is a wide margin in price. There is a rendering of tallow, a relatively large production of oleo oil and oleostearin; there is a heavy

¹ As an extreme example, on September 20, 1928, the range of cattle prices in Chicago was from \$6 to \$18 per hundredweight.

² Packers are now being forced to market cuts as well as quarters.

outturn of inedible fat and tankage and various by-products, mostly low-priced.

In the case of hogs, we have variations between regions, between classes within regions, and between grades and weights within classes, ranging all the way from scrubs to crossbreds and pure-bloods. We have bacon-type and lard-type hogs; butcher hogs, packer hogs, and "porkers."¹ Gilts may be marketed as such, bred and the sows marketed after the first farrowing, or bred repeatedly and marketed as packer sows. Barrows may be marketed early or late, light or heavy. The range of prices between different grades and sizes may be several cents a pound on the hoof, though the range is narrower than in cattle prices. Differentials are daily established all the way from coarse packer sows to fancy bacon pigs. Contrary to the practice with cattle, slaughterers of hogs are processors rather than sellers of raw carcasses. There is, indeed, a relatively large and growing consumption of fresh pork; but many of the hogs sold as fresh pork are not adapted to curing, and cured products comprise the larger part of the pork-packing business.

When sold fresh at wholesale, hogs are usually sold by the carcass; but certain parts, like loins, are also sold as cuts. Prime carcasses carry part of the burden of poor carcasses.² The packer divides the carcass into standard cuts, varying somewhat from region to region. The remainder of the carcass, the trimmings, and the viscera are utilized for a series of edible and inedible by-products, including a large volume of grease. The rendering of lard and making of sausage are important parts of the opera-

¹ Since the war fluctuating but surprisingly large numbers of feeder pigs pass through terminal stockyards; some come from husbandmen who confine themselves to raising livestock for others to finish, but many come from farmers who at the time find no incentive for finishing their own stock but dispose of animals to others.

² Packing houses employ tables for the cut-out values of hogs. Such tables, which are printed regularly, yield significant information. The following table,

tion. The several chief products of pork-packing bear various price burdens, and here, too, it is the highly esteemed parts that carry a disproportionate burden. Between the lean and the fat is a wide margin in price.

For hogs and cattle there is slaughter under and outside of federal inspection. For both cattle and hogs, but especially for hogs, special and extensive storage facilities are required on account of the time required in processing; in particular, storage stocks of hog products are often carried in large amounts over relatively long periods of time.

Broadly considered, therefore, we have in the corn-oats-cattle-hogs complex an intensive and extensive series of joint-product operations involving a number of pri-

reproduced from the *National Provisioner* of Sept. 12, 1931, p. 33, affords an illustration of the use of cut-out values to indicate slaughterhouse returns.

	160 to 180 pounds	180 to 220 pounds	220 to 250 pounds	275 to 300 pounds
Regular hams	\$1.59	\$1.43	\$1.39	\$1.35
Picnics .....	.50	.46	.44	.31
Boston butts .....	.52	.52	.51	.46
Pork loins	1.91	1.78	1.48	1.24
Bellies, light	1.09	1.01	.66	.21
Bellies, heavy .....	.....	.....	.25	.62
Fat backs .....	.....	.08	.21	.29
Plates and jowls.....	.07	.09	.12	.14
Raw leaf .....	.15	.16	.16	.16
P.S. lard, rend. wt.....	.92	.99	.87	.81
Spare ribs .....	.09	.11	.12	.12
Regular trimmings .....	.11	.13	.14	.14
Rough feet .....	.03	.03	.03	.03
Tails .....	.01	.01	.01	.01
Neck bones .....	.02	.03	.02	.02
Total cutting value (per 100 pounds live weight)	\$7.01	\$6.83	\$6.41	\$5.91
Total cutting yield.....	64.70%	67.45%	69.50%	70.50%

Crediting edible and inedible offal to the foregoing total cutting value and deducting from these sums the cost of live hogs plus all expenses, the following results are shown:

Profit per hundredweight	\$.43	...	...	...
Profit per hog.....	.73	...	...	...
Loss per hundredweight.....	...	\$.02	\$.38	\$.61
Loss per hog.....	...	.04	.83	1.75

mary products of major importance under shifting relations, and various secondary products of lesser importance under shifting relations. In joint-product operations, hypothetically all share pro rata in the joint expense up to the point of identification and separation of the several products; after the several products are segregated, each carries its separate expense account. The separate expense of a particular product is easier to compute than its share of the joint expense; indeed the joint expenses are usually divided according to "what the traffic will bear."

We have previously discussed the application of the equalization fee to corn. The application of the equalization fee, and the contemplated price increases on hogs, would be vastly more complicated. For hogs, how is the price increase to be distributed over the various parts of the animal? Viewed purely as technical and administrative matters, we surmise that the equalization fee and price control might be relatively simple for wheat and even for corn, but very complex for hogs. The more one regards the problem from the standpoint of joint-products, the more difficult will appear the administration of the plan.

SCOPE OF OPERATIONS IN RAISING THE PRICE OF HOGS

From hearings, debates, and press discussions, an idea may be obtained of the type of organization needed in the administration of the equalization fee.¹ There would be the Farm Board for the determination of policy and general supervision of operations, and operating corporations for the business conduct of affairs. The operating corporation may be termed the Hog Corporation, in

¹ Cf. Chester Davis, "Hogs and Corn in the Export Plan," *Wallaces' Farmer*, April 1, 1927, pp. 7 and 13-14; and L. J. Dickinson, "Handling Corn and Hogs under the McNary-Haugen Plan," *The Country Gentleman*, July 1927, pp. 12 and 53.

analogy with corn. Our war experiences have furnished us with instructive analogies of such trading corporations. Agreements and dealings with farm organizations, co-operative associations, packing houses, and exporters would fall to the trading corporations. The experiences of the trading corporations would be reflected back to the Farm Board and determine changes both in policy and in administrative procedures.

The objective of the Board would be to raise the average farm price of hogs. There would probably be pressure to aim at prices of hogs and corn so high as not merely to make operations directly profitable, but also to exert a favorable influence on land values.¹ The Farm Board would need to take account of the reactions of consumers, in order to prevent the Hog Corporation from setting too high a price, and thus fend the danger of price collapse; but the Board would not be a quasi-public corporation to harmonize the views of the producers and the consumers. The Corporation would, in effect, restrict price below the point regarded as prejudicial to consumption, define a range of control, and resist movement of price below a minimum; to do this, the Corporation would need to hold stocks, and within a range avoid both stimulation of supply and depression of demand. The responsibility for adjusting the equalization fee would rest on the Farm Board; the administration would rest with the Corporation. The Board would need to be empowered to impose limitation on exports, in order that domestic consumers should not be exploited without gain to producers. It would have authority to make loans to co-operative associations of hog producers, also to the Hog Corporation.²

¹ According to Henry Wallace the trend of hog values in Chicago is directly reflected in the trend of land values in Iowa. ("Trend of Iowa Farm Land Values," *Wallaces' Farmer*, September 2, 1927, p. 3.)

² Wheat could be held in the hands of a Wheat Corporation and also corn in the hands of a Corn Corporation. But hogs could not be purchased from

At the outset it is to be remarked that any undertaking substantially to raise the price of hog products would require additional tariff protection. Invasion by foreign fresh pork is hardly to be anticipated, though it is not hard to picture chilled carcasses being brought to Atlantic ports from the Southern Hemisphere. If the public turned toward beef as a result of increase in the price of pork, chilled Argentine beef could readily enter over the present tariff. The price of lard could hardly be advanced without higher tariff on vegetable oils; indeed, there is poor prospect of advancing the price of lard with increased tariff on all vegetable oils, except in the event of a short cotton crop which would make cottonseed oil relatively dear. Proponents of the equalization scheme have become fully aware that duty-free coconut oil from the Philippines makes difficult or impossible any substantial increase in the price of lard.

Two kinds of price-raising tactics would be possible—direct and indirect. Direct price raising would imply agreements with packers on purchase and sales prices. We take it the Board would set a minimum price, not a fixed price nor a maximum price. The Corporation would need to supervise price differentials between types, classes, grades, and weights of hogs, so as not to favor certain regions at the expense of others. In itself, the setting of differentials would be difficult enough. There are commonly seven grades of hogs regularly quoted at price differentials. Correspondingly, there are regular wholesale quotations on a long list of fresh cuts and green meats, smoked meats, dry salted meats, and wet salted meats. Many administrative problems would inevitably arise; but we take it that all administrative questions, outside

growers and held by the Hog Corporation; when ready, they must go direct from farm to slaughterhouse. But it might become necessary for the Hog Corporation to carry stocks of hog products.

of the basic price determination, would be subordinate to the policy on the ratio of prices of hogs and corn.

The Federal Farm Board would deal with both hogs and corn. Through agreement between the Hog Corporation and the hog packers, it would establish the basic minimum price for live hogs, with a range of differentials. In the case of corn, the Board (independently probably, but possibly also under agreement with processors) would be fixing a basic minimum price for No. 3 corn, with a range of differentials for grades and varieties. It would be necessary for the right hand (the Hog Corporation) and the left hand (the Corn Corporation) each to know the doings of the other. The price fixed for cash corn would have to be set with an eye on the supply of hogs; the price fixed for hogs would have to be set with an eye on the supply of corn. These ought to aid each other and not oppose each other. Prices of hogs and corn do not advance or decline uniformly throughout the country, and the variations would need to be given careful consideration. Having determined that corn and hogs must pull together, the Board would need to adopt a policy on trend of production and prices. Probably this policy would not need to be nation-wide, despite the fact that corn and hogs are raised on nearly five million farms; probably it would suffice if effectively applied directly to the corn belt.

The policy on trend would be the heart of the program. The Board would (a) favor expansion of the raising of corn and hogs, (b) favor contraction of the raising of corn and hogs, or (c) merely currently adapt the one to the other as well as might be possible under varying circumstances, to secure a relative stabilization of price.

The course of least resistance would be to adopt the third procedure, that of relative stabilization. When a corn crop happened to be heavy relative to the number of swine, the Corn Corporation would advise co-operatives

to store corn over the season and advise hog raisers not to increase breeding on account of the large crop of corn. The Board would advise farmers that a high hog price and favorable corn ratio would not mean a high hog price one or two years later. As varying circumstances might dictate in different years, the Board could use existing conditions in the corn crop for the guidance of operations of hog breeders and existing conditions in the hog crop for the guidance of corn growers, not with the purpose of determining long-time operations, but in the hope of minimizing the unfortunate swings in the hog and corn cycle that have so often brought losses both to growers of corn and to raisers of hogs. Most often the Board would address itself to hog raisers to adapt their breeding operations to the market as well as to the situation in corn. In order to provide a better method of forecasting prices of corn and hogs, the Board would need to amplify surveys on intention to plant corn and intention to breed hogs. With the aid of price control and the equalization fee, the Board, following this plan, would be seeking to do what national and state agricultural authorities have been working at for years—to adjust the production of corn and hogs to each other.

The Board might, however, adopt a policy of expansion, correlating acreage of corn with census of hogs and advancing both, with the idea of increasing gradually the outturn of hog products while still trying to avoid the upswings and downswings of the corn and hog cycle. This is what the majority of growers in the corn belt probably desire. With continuous improvement in the machinery for planting, cultivating, and harvesting corn, the number of acres that can be handled with one man's labor is increasing; viewing himself individually, the corn grower seeks capacity operation. But this will do him no good unless animals, especially hogs, are available to consume the corn, and markets are able to absorb the

pork at remunerative prices. One hears in the corn belt considerable talk of reduction of acreage of corn and restraint in breeding of hogs, and the rural press has numerous references thereto.¹ But this seems widely to be regarded as advisable or necessary only under the present system of marketing. A centralized system of marketing would be regarded as in part designed to permit of capacity operations for growers, to secure both wider market and higher farm prices. As a class, raisers of hogs and growers of corn are not seeking restricted operations at a higher price level. They desire unrestricted operations at a higher price level and, if possible, expanded operations at a higher price level. It has been often urged in discussions on farm relief that "the profit is in the surplus." Under these circumstances, pressure would be brought on the Board to authorize and secure a co-ordinated expansion of corn acreage and hog raising.

The other policy would be one of contraction. The present acreage of corn (despite occasional short crops) and the present outturn of hogs may presumably be regarded as too large for the population of the United States and reasonable foreign demand for American corn and hog products.² If one regards the prospect of relief through expansion of exports as illusory,³ still more illusory must seem hope of relief through per capita expansion of domestic consumption. The time until human population catches up with the corn crop and the swine crop (both progressively improving in efficiency) is too long. Following this view, the correct, but unpopular,

¹ Cf. *Wallaces' Farmer*, April 20, 1928, p. 5.

² See editorial in *Wallaces' Farmer*, July 22, 1927, p. 5: "The short corn crop will do two good things. First, it will hold the price of corn above a dollar at Chicago, and second, but most important, it will hold down hog production." This was said despite the stubborn facts that "with ordinary weather we shall have too much corn and too many hogs for the good of the farmers in the corn belt."

³ See below, pp. 544-56.

policy of such a Board would be one of contraction of corn acreage and restraint of hog breeding. If during the past half-dozen years we had had five million acres less of corn (without proportionate increase in other coarse grains) and a correspondingly smaller number of hogs, there would probably have been little sustained depression in the corn belt and no such debacle in land values as took place there.

How would the Farm Board proceed to execute a policy of contraction for higher prices? If possible at all, only through co-operative associations. If through leadership in the co-operative associations, growers of corn and raisers of hogs could be convinced that their commercial interests, in the direction of both operative returns and equivalent land values, would be enhanced by some contraction of operations, this might be put through under pressure of class solidarity. Previous experiences with recommended reductions have not been encouraging, but they have never been undertaken under effective co-operative organization. The first step would be for the Board to adopt the policy; the next step to convert co-operative leaders to this policy; the last step would be for co-operative leaders to secure adherence by individual farmers in the corn belt. The support of the state agricultural colleges and the rural press would be indispensable. If fewer acres were planted to better varieties of corn, cultivated and harvested more efficiently; if the breeding stock of swine were reduced by selection, the size of litters increased, and the animals fed for early maturity and for lean rather than fat; if these two contractions could be conjoined and correlated so as to secure a proportional net reduction in outturn of both corn and hogs, at a lower unit cost of production, the problem of surplus of corn and hogs would be in process of solution.

In short, the Board could follow one of three policies: the mercantilist policy of expansion, a temporizing policy

of stabilization, or a reformatory policy of contraction. To these we shall later recur for more detailed discussion.¹

In undertaking any program of expansion, the Board would need to be alert to detect new developments. With higher prices, domestic consumption would presumably decline, first relatively and then absolutely, expressive of the reaction of the consuming public to expensive pork. Secondly, expanding the export of hog products, especially lard, would tend to lower prices in export markets, and would tend to lower prices of vegetable oils. Decline in prices in export markets would increase the losses to be covered out of the equalization fund. Despite lower prices, progressive increase in volume of exports could not be kept up and accumulation in storage in the United States would result; with negative reaction by domestic consumers and foreign demand at the limit, storage space would then be filled in the United States and the packing houses would be unable to accept all of the hogs offered. Agreement between the Hog Corporation and the packing houses would apply to prices of live hogs, but could hardly obligate the packers under all circumstances to accept all animals offered at those prices. The hogs would dam back on the farms, a situation made all the more ominous by the fact that under the circumstances the on-coming crop of young pigs would be large. The suggestion of a "base-line" price, below which the Hog Corporation would take over ownership of hogs in order to prevent a break in price, is impracticable; one can "hold the bag" for grains, but not for live hogs. The sequential result would be a break in prices following refusal of packers to accept all animals at the agreed price level, with confusion everywhere and demoralization of relations between the Hog Corporation and packers. The possibility of such a contingency was illustrated in 1919.

¹ See below, pp. 413 ff.

A difficult and delicate adjustment of the Board would lie in balancing the efforts between surplus-producing and deficiency regions. Whether the policy be one of expansion, stabilization, or contraction, the reactions of corn growers and hog raisers in deficiency regions would be different from those in surplus regions. The Board would naturally endeavor to avoid setting these regions against each other. If a policy of stabilization were undertaken, this would apply mostly to the corn belt. From one point of view it might be regarded as demonstrably good policy to encourage hog production in the deficiency regions while discouraging it in the surplus regions. But from another point of view, that of comparative advantage, it might be good policy to discourage hog production in the deficiency regions in order to enlarge the market for the products of the corn belt. The relations of animal husbandry to diversified agriculture everywhere would need to be carefully appraised. The trouble, of course, lies chiefly in the surplus area; but the amelioration of distress in the corn belt ought to be sought without provoking untoward developments in deficiency regions.

It is significant that farmers engaged in the raising of cattle have given little support to the equalization fee. Indeed, opposition on the part of farmers engaged in cattle raising was so strong that cattle were omitted from the bill that was passed by the Sixty-ninth Congress.¹ This was due largely to the clash of interests between raisers of cattle and finishers of feeders. An Iowa husbandman raising cattle and hogs side by side, for fattening on his own farm, would have the same interest in an equalization fee on cattle as on hogs, if he believed it would raise

¹ Chester Davis, in his article on "Hogs and Corn in the Export Plan," in *Wallaces' Farmer* of April 1, 1927, p. 7, stated that "cattle were eliminated from the bill on the ground that there is no surplus above domestic needs of beef at present or in the immediate foreground." This, however, disregards the beef-price of corn; and the price of cattle has again become, as it was several years ago, "too low," with the country on the domestic basis.

the prices of finished live animals, and thus indirectly the price of corn. But a large number of husbandmen buy both feeders and corn. The influence of cattlemen in the grass and range states is against an equalization fee applied to their cattle. Finishers of feeder cattle who buy corn are opposed to a higher price for corn since they are not convinced that consumers would pay higher prices for beef. Sellers of dairy calves and cows naturally oppose an equalization fee on them. We have no export of dressed beef or of beef products, except to an insignificant extent. All in all, on account of consumers' reactions, it seems to be accepted that the price of beef cannot be raised by any form of valorization. Therefore, beef cattle were merely left to shift for themselves behind the tariff wall, without attempted "equalization with industry." But of course, an increase in the price of pork would be welcomed by cattlemen.

We are neither an importer nor an exporter of mutton or lamb, to any extent; but we are a heavy net importer of wool. What sheep raisers want is a higher tariff on wool and pelts, not an equalization fee. Naturally, an increase in the price of pork would be welcomed by them.

If each farmer owned his statistical proportion of cattle, hogs, and sheep, the situation would be simple; but with distribution of cattle, hogs, and sheep highly unequal, husbandmen are divided into conflicting classes. Clearly, if hog raising were in the same position as cattle raising and sheep raising, the equalization fee would never have been seriously considered. Contrariwise, because cattle and sheep are in a different position from that of hogs, the equalization fee is not under consideration for them. These several relations would need to be kept in mind by a Farm Board engaged in determining the scope of operations in raising the price of hogs under the operations of an equalization fee.

LEVYING THE FEE

The proponents of the equalization fee have usually left it open to have the fee levied on "the transportation, processing, or sale" of the unit of agricultural products. Levied on transportation, this would mean collecting the fee on live hogs with the freight bill. Levied on processing, this would mean collecting the fee on slaughtered carcasses or packing-house products. Levied on sales, this would mean collecting the fee on animals sold for slaughter or on fresh and cured products in course of sale. If public carriers were called upon to collect and remit the equalization fee levied on live hogs, it would be subtracted directly from the farm price. If slaughterers and packers were to collect the fee on live hogs, it would be subtracted from the terminal price of hogs and reflected back to the farm. Finally, if processors were to collect the fee on hog products, it would be still subtractable from the farm price, but more indirectly and distantly. We are not here concerned with the question of ultimate incidence.

The equalization fee on hogs might be levied at the source, on the original sale of the animal. But it is agreed that feeders and breeding stock ought to be relieved of the charge. Obviously also, hogs sold from farm to farm would carry no fee, for the simple reason that it could not be collected. By and large, it strikes us that levying the fee on the farm would be unfeasible. If the fee on hogs were levied on transportation, many hogs going to rural and local slaughter and hogs delivered by truck would escape; trucking companies operating as common carriers could be placed under regulation like railways, but private and contract trucks would go free of control.

The proponents of the equalization fee have endeavored to regard it as a fee in regulation of commerce. The opponents regard it as an excise tax. Many farm leaders

regard the equalization fee as neither a tax nor a regulation of commerce, but as a legislative device for compulsory co-operative marketing. If the equalization fee were defined as an excise tax, it would be applicable to all swine on sale or slaughter. But if it were to be levied as a regulation of commerce under the interstate commerce clause of the Constitution, the application would be correspondingly restricted. If the equalization fee were to be collected on transportation, could it be collectible on intrastate shipments via intrastate carriers as well as on interstate shipments over railways engaged in interstate commerce? Bill S. 1176 had the following declaration of policy:¹

In order to stabilize the current of interstate and foreign commerce in the marketing of agricultural commodities and to prevent existing suppression of commerce with foreign nations in such commodities and unjust discrimination against and undue restraints and burdens upon such foreign commerce in favor of interstate or *intrastate* commerce in such commodity, it is hereby declared to be the policy of the Congress to promote the orderly marketing of agricultural commodities in interstate and foreign commerce and to that end, through the execution of the provisions of this Act, to provide for the control and disposition of surpluses of such commodities, to preserve advantageous domestic markets for such commodities, to prevent such surpluses from unduly depressing the prices obtained for such commodities and from causing undue and excessive fluctuations in the markets for such commodities, to minimize speculation and waste in marketing such commodities, and to further the organization of producers of such commodities into co-operative associations.

The inclusion of the word "intrastate" in the sixth line was apparently relied upon by proponents of the measure to make effective the levy of the equalization fee on hogs moving in intrastate commerce and on packing-

¹ S. 1176, 70th Congress, 1st Session, December 6, 1927, "A Bill to establish a Federal Farm Board to aid in the orderly marketing and in the control and disposition of the surplus of agricultural commodities in interstate and foreign commerce," by Mr. McNary. Italics ours.

house products, marketed for consumption within the state. We have sought no legalistic analysis, but it is important to point out the distinctions and operations under the two sets of circumstances.

If the equalization fee could be applied to hogs and hog products moving in intrastate commerce, it would mean that hogs shipped from one county to the next via public carriers would bear the fee except when certified to be feeding or breeding stock. It would apply to small-town slaughter for fresh consumption, whenever the hogs were shipped via public carriers, no matter how short the journey, and to the cured products and lard of packing houses, if the hogs were brought in by public carriers.

If, on the other hand, the equalization fee were to apply only to hogs and products entering interstate traffic, the outcome would be quite different. Applied solely to interstate commerce, hogs by the millions would escape the equalization fee that would be subject to the levy were it applied also to animals and products in intrastate commerce. Not only would collecting the fee on interstate shipments by public carriers stimulate intrastate shipments in private trucks, it would favor interstate shipments in private trucks if the fee were levied on shipments by public carriers. A survey of the location of smaller packing houses will indicate how many of them are located within easy trucking distances of supplies of live hogs in adjacent states.¹

To levy the equalization fee as an excise tax on slaughter would involve an enormous administrative problem, and obviously would lead to expansion of rural slaughter. In levying any tax, the best solution is not indicated by the largest number of points of application on paper, but includes consideration of gross returns and costs of collection with varying numbers of individuals brought

¹ Cf. G. F. Henning, "The Influence of the Truck in Marketing Corn Belt Livestock," *Journal of Farm Economics*, July 1931, XIII, 376-92.

under the tax. The administrative difficulties of levying the fee cannot be dismissed as details; they would be determinative of success or of failure. During the past five years, according to the Bureau of Animal Industry of the Department of Agriculture, over one-third of the estimated slaughter of hogs occurred in establishments outside of federal inspection. Since the volume of rural and local slaughtering, already large, could be readily extended if profitable, the problem of illicit country slaughter in the event of application of an equalization fee to slaughter of animals would become a matter of large administrative importance. Slaughter of swine outside of federal inspection would seem far too extensive to be exempted from the equalization fee, if price increase is to be made effective; yet it is too scattered for the collection of such a fee to be effectively enforced.¹

Comparable difficulties were encountered in European countries, belligerent and neutral, during the war. In every country the attempt to control animal husbandry and meat products broke down on account of the complexity of the price relations, the overwhelming burden of administrative detail, and the uncontrollability of illicit operations so extensive as to undermine the system of determining procedures and prices. In every country in Europe outside of Great Britain (where control was favored by isolation, small rural population, dependence on imports, and a unique war psychology) the control of animal husbandry and of the prices and distribution of animal products bordered on the farcical.

The simplest administrative arrangement would be to

¹ Cf. J. D. Black, *Agricultural Reform in the United States*, p. 251, as follows: "There would be difficulties in applying the equalization fee plan to pork. Only 80 per cent of the pork slaughtered in the United States in 1927 was in inspected plants. Besides, the vast amount of slaughtering by local meat markets, is the slaughtering done on farms for sale of fresh pork and various cured-pork products. All of this would be greatly stimulated, whether or not the fee was supposed to be collected on such slaughtering."

forego the equalization fee on hogs destined for fresh consumption and on all slaughter outside of federal inspection, and confine it to animals killed in federally inspected establishments and cured for interstate or export shipments. This, of course, would imply that in some regions most of the hogs would escape, and it is doubtful if it would cover much more than half of the total annual slaughter. Despite this, it would prove the least intractable method of applying the fee, so long as price control were to be applied to contracts with packing houses.

So far as the theory of the equalization fee is concerned, there is no reason why it should not be applied to the cured products.¹ Packers, in effect, would subtract from the producer's price the figure of the equalization fee as based on their selling prices. The packers would face a problem in reflecting it back to the prices of live hogs—which might or might not be as difficult as the reverse problem of reflecting an increased price of live hogs forward to the several packing-house products.

Just how the figure of the equalization fee, the rate base, would be arrived at is a question as important as it would be difficult. The volume of export of hog products upon which losses would need to be covered, the policy of expansion or contraction of exports, the proportion of the domestic hog supply covered by the fee, the height of hog prices aimed at in the price-raising program, and the commercial interests of packing houses would all be factors in the determination of the rate. The farmers would judge the equalization fee by the price of live hogs aimed at. In the earlier discussions, a high hog price and a high equalization fee seem commonly to have been taken for granted. Subsequently, both of these figures were moderated.

¹ In the earlier McNary-Haugen bills, this was clearly contemplated. The McNary Bill for 1927 (*S. 1176*) would seem to countenance this for tobacco but not for hogs.

Even with a rate base determined for the equalization fee, numerous problems would remain. Would the fee on hogs be set at so much per head, irrespective of age, size, type, and quality? It would seem inequitable to have the same fee, or rate, levied on suckling pigs, gilts, barrows, bacon-type hogs, butcher hogs, prime lard-type hogs, packers, old breeding sows, overweight sows, and stags, irrespective of their market prices. It would seem necessary to devise a series of premiums above and discounts below a standard. Should the fee represent a percentage of the price? Or, finally, would the equalization fees on corn and hogs be established on the basis of a corn-hog ratio—for example, 5 cents a bushel on corn and 60 cents a hundred pounds on hogs, being the ratio of 12 to 1? These inquiries illustrate the complexities surrounding the imposition of the fee.

The point made by opponents of the McNary-Haugen Bill, that the plan could not be administered without the co-operation of packing houses, has apparently been accepted by most of the proponents of the equalization fee. The connection seems obvious to us. The opponents have insisted further that effective agreements with packing houses would imply a government guarantee of packing-house operations on the cost-plus basis—in effect, a subsidy of pork packing. But this implication was rejected by proponents of the proposition, who insist that it ought to be possible to secure fair prices by agreement, safeguarding alike the interests of consumers and producers and restricting the packing houses to the modest return that would be commensurate with a riskless operation. That the Farm Board and Hog Corporation could not raise prices without the co-operation of the packers seems to be conceded by leading proponents of the measure.¹

¹ Cf. L. J. Dickinson, "Handling Corn and Hogs under the McNary-Haugen Plan," *The Country Gentleman*, July 1927, p. 53; and Chester C. Davis, "Hogs and Corn in the Export Plan," *Wallaces' Farmer*, April 1, 1927, pp. 7 and 13-14.

Under these circumstances, the most practical (if incomplete) method of applying the equalization fee would be to levy it on slaughtered animals in federally inspected establishments operated under contract with the Hog Corporation, under approval of the Farm Board. From the agreed prices on live hogs a stipulated fraction or sum would be subtracted and remitted to the Farm Board for inclusion in the stabilization fund. But under such a simplified arrangement the psychological effect of direct application would be relinquished. It has been urged that the influence of the fee in repression of production would lie in the personal experiences of farmers witnessing the equalization fee directly subtracted from the farm price. Now if the fee were collected at packing houses, the effect of collection at the source would be lost, since farmers would not feel an impost they did not see paid. The point might seem important to one who believes that the equalization fee would control production. If one does not credit this, whether the fee is paid by producers or not is of no importance.

AGREEMENT WITH PORK PACKERS

A Hog Corporation would be formed by organizations representing hog producers in the leading corn and hog states.¹ This Corporation and the pork packers would

¹ Cf. Chester Davis, *loc. cit.*; also statement of Congressman L. J. Dickinson in "Handling Corn and Hogs under the McNary-Haugen Plan," *The Country Gentleman*, July 1927, p. 53:

"One stable price for hogs in the domestic markets running along through the season without regard to the price for which the surplus must be sold abroad would be one of the objectives of the Farm Board operations. Every farmer knows that the price of pork must not be set too high, for the consumer will turn to beef and other meats.

"A trading corporation representing the hog raisers in conference with the packers could come to terms on the right domestic price level for hogs for the coming year, taking into consideration the probable pig crop and the volume of domestic consumption. The packers could then offer this price with allowance for local conditions and subject to the approval of the Farm Board."

The McNary-Haugen bills vetoed in 1927 and 1928 granted powers to the Board to enter into price agreements with packing houses. In the draft bill

come to agreement on procedures and live hog prices, to be ratified by the Federal Farm Board. It is sometimes assumed that it would be sufficient to reach an agreement with the few large packing houses; but we take it that the smaller packing houses would refuse to intrust their interests to the large packers, and could not be denied representation.

The Hog Corporation and a representative packers' committee would agree on the amount of hog products required at home and the prospective extent of exports during the year of operation under consideration. They would forecast the number of marketable hogs in the country, the oncoming pig crop, and the supply to be expected for winter and summer slaughter in view of the crops and prices of feed grains. They would thereupon agree upon a range of live hog prices, presumably a basic minimum price for a certain type and weight with appropriate differentials, discounts, and premiums, for other types, grades, and weights. Obviously, the exactness of the range of prices would depend upon the accuracy of statistical information on the points stated, and the schedule should have provision for flexibility. The Farm Board would approve the agreement, or secure modification acceptable to all, and then fix an equalization fee for the year.

From this point, views diverge. What seems to be the leading view runs to the effect that the packers, parties to the agreement, would have to look out for themselves in the selling prices. As Chester Davis has put it: "The

introduced by Senator McNary on December 6, 1927, such agreement was not included but, instead, expressly forbidden, with the view of maintaining competition between packers. "The price at which the surplus or any part thereof is to be acquired or disposed of under any marketing agreement shall not be fixed in such agreement, but all such acquisitions and disposals shall be made subject to the prevailing competitive conditions of the markets in which they occur." (See S. 1176, December 6, 1927, 70th Congress, 1st Session, p. 11.) As the bill emerged from conference, however, this was changed and provided for agreements with packing houses.

ability of the packers to sustain the agreed price would depend upon their *opportunity* [italics ours] to resell the packing house products at prices that covered their operating costs and capital return."¹ Some packers might have a divided commercial interest, since they are exporters of competing meat products from the Argentine.

Assuming that the export trade had a separate accounting, under this view it would be up to the packers to make profits on hog products on the domestic market with the live hog prices they had accepted. This would imply that during negotiation of the agreement packers would hold out for low hog prices; and they might hold the whip hand, because—all talk of the Hog Corporation or Farm Board leasing packing houses, contracting for packing services, buying packing houses, or building packing houses to the contrary—there could be no earnest consideration of duplicating existing establishments. The idea of having the Hog Corporation own or control plants with which to cut in and cut out of pork packing, according to circumstances, seems too far-fetched. Under such circumstances, each annual decision as to the price of hogs would be a compromise, but a compromise dictated mostly by the packers, at least until such time as the Farm Board could prove that under earlier agreements the packers had been making exorbitant profits. It would not be the fee, in the final analysis, that would enable the price to be held up, but rather the regulation placing packers under compulsion to make an agreement as to purchase price.

A second method would be to reach an agreement on packing-house profits, base the hog price thereon, and correct both with experience. In such an agreement, the

¹ "Hogs and Corn in the Export Plan," *Wallaces' Farmer*, April 1, 1927, p. 7. It is interesting to note that Chester Davis has assumed such a price would be "at about the price level that would result from a balance between the domestic consumption and production of pork, with no considerable surplus for export."

position of the packers would be more tractable than under the other method, because the terms as to profit would be public. The packers would expect (a) an allowance for upkeep and depreciation, (b) authorization to include fresh investments (if, as, and when deemed necessary), despite existing overextension of packing houses, (c) coverage of overhead and labor costs, (d) interest return on investment, and (e) interest return on borrowed money.¹ Each one of these points would be controversial and would be settled by compromise. The proper rate of interest on investment would be in dispute. The determination of extent of investment would carry with it the familiar inquiries on cost of plant, cost of reproduction, outstanding shares, book value, etc. Rate of depreciation is difficult to determine. Whether bank loans should be allowed to earn, in addition to the interest paid to the bank, the same rate of interest allowed on the investment would be an important issue. These points would all be controversial, but everything would be in the open. This procedure, while difficult initially, would become simpler with experience. This procedure is, furthermore, directly in accord with the conception of hog raising, slaughtering, and pork packing as a vertical integration—as Chester Davis puts it, “based on the treatment of the business of producing, finishing, slaughtering, packing and marketing pork as one big industry rather than as split up into conflicting groups.”² In reaching such an agreement on costs and profits, the farmers would lay before the conference, for comparisons with the accounting of the packers, their statement of farm accounting with appropriate items of upkeep and depreciation,

¹ Since the administrative board, through inability to control illicit trading, would be in no position to guarantee to the contracting, packing, and processing houses their customary markets and the elimination of illegal competition, this would tend to lead to some widening of the operating margin by contracting packing houses.

² *Op. cit.*, p. 7.

interest on investment, labor cost, and profit. Only in such a manner would it be possible for the producer class to have the costs and profits at the one end considered in connection with costs and profits at the other end.

If the returns on the domestic business did not in any year cover the agreed level of returns to packing establishments (with adjustment for the services used in the export fraction), then for the following year some change in arrangement would be necessary whereby a relatively lower purchase price would be authorized in order to enable the packing houses to recoup. In the event in any year of larger profits being secured on the domestic business than contemplated in the agreement, some change in arrangement would be necessary for the following year to pay a relatively higher price for live hogs in order to bring packers' returns down to the agreed level.¹ This scheme comes close to plain valorization and little resembles the scheme of allowing domestic price to rise behind the tariff wall.

In our view, it would not prove practicable to fix the live-hog prices and then have the packers free to seek out profits on that basis as best they could; it would be necessary to agree to a cost-plus operation for packing establishments on some stipulated price basis for the export fractions. This brings us to the third method.

A third method would be to confine the agreement between the Hog Corporation and the packing houses to live-hog prices and exports of hog products, leaving the domestic market for hog products free and competitive. Such an arrangement would provide for a stated profit on exports, with adjustment of losses to be paid out of the equalization fund. This is probably the arrangement

¹ Administratively, it would be much simpler to have the packers' risks and the Board's risks defined on the domestic fraction. The payment of losses on the export fraction would of course include a pro rata or stated profit at the agreed rate.

that would best meet the views of the moderates on both sides of the discussion. With a relatively riskless export trade, a low rate of profit thereon would suffice; this the producers might grant in the interest of practicability, retaining in the domestic market the open competition regarded as essential to the interests of the consumer class.

Any such agreement with the packers would presumably need to contain some provision governing the conduct and extent of export business. The packing houses would seek capacity operation—the larger the riskless export the better. Probably, most farmers in the corn belt believe in expanding exports. But for the Farm Board, increasing exports would mean raising the equalization fee and augmenting the difficulties of accounting between the domestic and the export fractions. If the domestic and the export fractions stood under a common agreement, with a joint accounting, that would be one situation. But if the agreement guaranteed packers against loss, or were a cost-plus operation, on the export fraction, leaving the packers with the agreed purchase price to shift for themselves for profits on the domestic fraction, that would be a very different situation. The Board could hardly deny the equity of the packers' demand for export outlet for hog products in their possession in pursuance of a policy of slaughtering all animals offered at the agreed price. On the contrary, the Board could not afford to allow the packers to keep the country low in hog products by forced exports, for reasons of effect on domestic prices and on hog production. Some commentators have envisaged a situation in which the scheme would be so administered as not to involve or permit extensive exports. It is difficult to believe that the packers on one side and the farmers on the other side would tamely permit the Board to follow that policy. Certainly, the present tendency of declining exports of hog products is not to the satisfaction of the corn belt.

Some supporters of the equalization fee do not advocate fixing a basic price on live hogs and are in particular opposed to agreements on profits of packers and exporters or to any intervention in the matter of selling prices. They would limit the Farm Board and the Hog Corporation to marketing agreements designed to provide for the withholding and disposal of any part of the surplus necessary to sustain selling prices, i. e., to a holding movement. If the functions of the Farm Board and of the Hog Corporation were thus restricted, this would imply giving to the Corporation the rôle of a stabilizing super-trader, with the retention, otherwise, of competitive conditions in the markets. It would imply that the Board and the Corporation would merely lend money on stocks and carry-over, seek out new markets, and endeavor to stabilize prices through withdrawal of wholesale or retail stocks from otherwise forced sales. Under such a formulation, the relations of the packers and the Corporation for the most part would be competitive rather than correlated. The packers would have the first opportunity at the market, so to speak, and the Corporation would carry the stocks instead of the packers. This view of the procedures, clearly representing the minority opinion, reflects a limitation of objective; it is drawn from the analogy of the grain and cotton trades. But the view indicates that some supporters of the equalization fee now appreciate the extent of operations and the difficulties involved in raising the prices of hogs and hog products. In the description of Chester Davis is a combination of stabilization and valorization; but we take it that what amounts to valorization most coincides with that farm opinion which inclines toward the equalization fee.

PRICE INCREASES OF THE SEVERAL HOG PRODUCTS

Initially, the proponents of the equalization fee aimed at an increase of from 3 to 4 dollars per hundredweight

of live hogs; later, the more commonly suggested objective has been from 1 to 2 dollars. We have not felt tempted to compute the hypothetical effect of the equalization fee on hog products. J. D. Black¹ has suggested that under the present tariff duty on lard a domestic premium of 0.53 cent a pound might be secured, obviously an increase hardly worth the trouble. He made no estimate for cured pork products. M. J. Ezekiel, quoted by Black, found that the increase in exports to be expected under the equalization fee would decrease world prices by nearly the amount of the premium and the net gains would just about cover the cost of administration. According to Ezekiel, higher tariff duties and higher equalization fees held out little promise of increasing gains. At the outside, Ezekiel estimated that from 1921 to 1926, if the entire increases in prices of hog products had been reflected back to prices of live hogs, these would have been increased from 3 to 9 cents per hundredweight and the net gain would have ranged from 3 to 9 million dollars. Nor is the situation made notably more favorable if one assumes that a slightly higher price on hogs would aid the prices of cattle and sheep.

The proponents of the equalization fee do not seem to have given due attention to the price spreads between the different hog products. Pork packing is a highly specialized joint-product operation. The cured parts carrying high prices are smoked bacon, hams, and shoulders; the lower-priced fraction includes lard and the various cuts of sides, backs, bellies, plates, and ribs sold as pickled, salt, or mess pork.

To give an illustration of the range of prices, on a random day in the fall of 1927, packers' selling prices for smoked bacon were 27-30 cents, for hams 21-24 cents, for shoulders 15-18 cents, for clear bellies 12-15 cents,

¹ *Agricultural Reform in the United States*, pp. 243-45.

for fat backs 11–13 cents, for leaf lard 12.75 cents, for other lards 7.5–12.5 cents, with refined cotton seed oils quoted at 12–13 cents. The range of differences varies somewhat from year to year, but the foregoing illustration is representative.

In the selling of processed hog products prepared from hogs purchased at an elevated price, the various parts could not carry their pro rata shares. Of a butcher hog of 200 pounds weight, the fresh hams, picnics, and bacon cuts amount to about one-third of the live weight. The loins and butts would be sold fresh; the remaining lean parts, with appropriate amounts of fat, would be turned into sausage or other prepared meats. The backs, plates, and jowls would be put into dry salt or brine. The rest of the carcass, including the visceral fats and the trimmings, would be rendered for lard. With ascending prices, each product would sooner or later encounter increasing sales resistance. The prices of fresh carcasses could probably be notably increased; the prices of viscera, offal, tankage, hide, and the various by-products could probably not be increased at all. But even for fresh meat, the heavy carcasses could not stand much price increase.

In current packing-house practice the slaughtering department sells carcasses and cuts at going market prices; with the use of prices paid for live hogs and prices received for carcasses, cuts, viscera, and other subordinate fractions, the slaughter accounting is closed. The loss of weight on killing and dressing, the shrinkage from live weight to carcass weight, declines as the live weight rises, but notable and often unforeseeable variations occur. The curing department buys its cuts as raw material, and the prices paid represent the beginning of its accounting. The prices of live hogs and of the standard cuts do not move relatively and synchronously. Also, the value of the cuts in terms of packing-house quality vary rather surprisingly from animal to animal within the grade. Under

these circumstances occurs what is known in packing-house parlance as "cutting hogs at a loss" or "cutting hogs at a gain." Concurrently the stocks of cured products are re-inventoried on the basis of market prices, i.e., adjusted on a replacement basis. Thus, in the profit-and-loss account of a packing house are numerous instances of inventory loss or inventory gain, applied to the division of cured products. In a hog-price decline, packers take heavy losses on inventory, in a rise they obtain a heavy gain; but in neither case can outturn be adjusted. The slaughtering division has no comparable situation; it has the relatively simple function of buying as cheaply as possible live hogs which yield cuts of widely varying qualities.

Packing houses purchase live hogs partly on government standards but still more on the adjudgment of experienced buyers. To a rather surprising extent the outside appearance of a live hog fails to reveal the quality of the cuts. This is not merely traditional packing-house experience; it has been repeatedly proved in competitive tests in which live hogs have been scored by packing-house experts and experts in animal husbandry, and the score-cards checked against the evaluation of the cuts from the animals after slaughter. The results of such tests have often failed to indicate any superiority of the expert in animal husbandry over the packing-house expert, but, often enough, the judgment of each is wrong to a substantial extent in the overvaluation or undervaluation of the animal under test.¹

Since the war, developments in consumption have brought about changes in packing-house practice. Cured fat cuts have lost favor; there is a relatively declining demand for pickled pork. Fat salt pork has lost much of its standing as a ration for working men; also, there are

¹ Cf. Guy Bush, "On the Hoof, On the Hook, On the Block," *Wallaces' Farmer*, July 12, 1929, p. 6.

relatively fewer men doing hard physical labor, or active in exposed occupations.¹ Against this there has been an increase in the consumption of fresh pork and of pork sausages.² Public esteem for fresh pork has facilitated the marketing of the loins and butts of animals whose hams, shoulders, and bacon are smoked. Sausage now absorbs a large amount of the average heavier carcass slaughtered under federal inspection; this outlet has great importance for the packer, but sausage can carry only so much fat. Since the demand for pickled pork is declining, more of the lower-grade carcass must be sent to the rendering plants for lard. The situation is worst for packer sows and for heavy butcher hogs not meeting the standards for smoked bacon. The commercial yield of lard is not a criterion of the fat-content of the animals; it may mean a different trimming and a changed production of mess pork.

The recovery of lard per carcass and the proportions of lard to salt pork depend on the type, weight, and quality of the carcass, but also on the cutting employed and on the prices of salt pork. According to the Bureau of Animal Industry of the Department of Agriculture, the lard of inspected packing houses now amounts to about 36 pounds per average animal, or about 23 per cent of the carcass weight.³ The method of trimming the carcass

¹ In an address at the Iowa Fair on August 26, 1929, C. B. Denman, livestock representative on the Federal Farm Board, made the following statement, as reported in a Farm Board press release of that date: "Since the Great War period, the ever-declining consumption of salt meat and lard in this country and the overproduction of that commodity has cost the farmers of America 350 millions of dollars annually. Using the price trend of pork chops, ham and bacon as against salt meat and lard, it is easy to understand this decreased consumption when we consider that we have less manual labor to consume salt meat and also that there are more than 80 competitors on the market to-day for our lard."

² The sausage production (pork and beef) in plants under federal inspection is over a billion pounds a year, with perhaps half as much more outside.

³ Bureau of Agricultural Economics, U.S. Department of Agriculture, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930*.

in the cutting-room is subject to modification according to the characteristics of the carcass and by variations in the price levels of the different products. The hams may be cut long or short, skinned or left unskinned; there are several ways of cutting the shoulders; heavy backs and sides may be pared; trimmings may not be good enough for use in sausages; and so on. It seldom occurs with butcher hogs, unless very coarse, that the prices of fat backs, bellies, clear sides, or short ribs are so low as to justify sending these cuts to the rendering tank, but the cuts may be pared. Packer sows, on the contrary, may be so coarse that the backs, plates, and bellies are marketed to better advantage as lard than as salt pork. When the hog is too fat, a layer of fat is trimmed off, to go into lard; thus the fat backs of heavy hogs may be trimmed to resemble those of medium-weight hogs. The trend of operations is clearly in the direction of relative diminution of outturn of wet and dry salt pork and increase in the outturn of lard.

The situation varies somewhat with the character of the hogs sent to market. When, under the stimulus of high prices per hundredweight, farmers feed their hogs heavily and send to market an unusual proportion of heavy butcher hogs weighing 250-300 pounds and over, and of packer hogs weighing over 300 pounds, the difficulties of retailing are substantially increased, because the fat fraction is disproportionately heavy and the lean cuts not of prime quality. When, on the other hand, farmers market their animals at the preferred weights—namely, in the neighborhood of 200 pounds—this facilitates merchandising of the products, because the proportion of the fat is low and the quality of the lean cuts high, other things being equal. Under the circumstances usually to be anticipated, the largest part of any increase in price falls on the loins sold fresh and on the hams, shoulders, and bacon sold cured. Salt pork would carry less.

With lard, not much could be hoped for in the direction of price increase, other things being equal. On a strict accounting basis, the lard produced in federally inspected packing houses is in most years probably sold close to cost, at times at a loss. The price of lard remains so relatively low, and so large an amount must seek an outlet abroad, largely because household and public eating-places in this country make extensive use of lard substitutes (prepared mostly from vegetable oils) and vegetable oils.¹ As a class, vegetable oils are naturally cheaper, and, therefore, except in the event of a shortage of vegetable oils, little can be hoped for in the direction of advance in the price of lard.

The varying relations of prices of hogs and lard may be illustrated in three comparisons since the war. The average price (per hundred pounds) of live hogs at Chi-

¹ Lard and cottonseed oil present an interesting contrast. Lard is the chief by-product of the agriculture of corn and hogs; cottonseed oil is the chief by-product of cotton agriculture. The cotton grower sells his cotton and cottonseed separately; the hog raiser sells his lard in his live hogs. We have the impression that in most years the cotton fiber bears a larger proportion of the burden of cotton agriculture than does lean pork in the case of swine husbandry. In explanation of a chart in the trade journal of Armour and Company (*Monthly Letter to Animal Husbandmen*, Armour's Livestock Bureau, June 1927, VIII, 6), it is stated that since 1913 "lard and tallow have been below their normal relationships to all-commodity and food prices. The vegetable oils have in general been in better circumstances." The prices of both lard and lard substitutes are related to the combined production as well as the differential production. Over long periods, probably cottonseed oil bears the same relation to cotton fiber as lard does to cured pork products. To date, American lard feels the competition of substitutes much more keenly at home than abroad.

The current manufacture of lard compounds and other lard substitutes is something close to 1,200 million pounds per annum, nearly half of the estimated total lard production and equal to three-fourths of the reported production of federally inspected lard.

Lard has a seasonal consumption, heaviest in autumn and winter and lightest in spring and summer. This is indicated in the comparative prices of lard and vegetable substitutes, the relation being in favor of lard during the fall and winter and in favor of substitutes during the spring and summer. Whether the prices of lard substitutes follow or lead the price of lard depends on the size of the cottonseed crop and market receipts of hogs. With a short cotton crop, lard ought to be disposed of at cost or even at a profit; but with a large cotton crop it may be sold at a loss.

cago in 1922 was \$9.22, as against \$8.51 in 1921; but the average price (per hundred pounds) of refined lard in 1922 was only \$13.07, as compared with \$13.21 in 1921. Similarly, the average price of hogs in 1926 was \$12.34, compared with \$11.81 in 1925; but the average price of lard was only \$16.91 in 1926, compared with \$17.90 in 1925. On the other hand, the price of hogs in 1923 was \$7.55, compared with \$9.22 in 1922; but the price of lard was \$13.90 in 1923, compared with \$13.07 in 1922.

In summary, with the present popularity of fresh pork, some increase in the price of live hogs could be passed on to fresh pork. The viscera, offal, tankage, hide, and by-products could be expected to carry no increase in price. The lard and salted fat backs, plates, ribs, and bellies could carry little increase in price. The hams, breakfast bacon, and shoulders, cured products, and the fresh loins and butts from the same carcasses would have to carry most of the increases in price. A more detailed illustration will prove illuminating.

ILLUSTRATION OF DISTRIBUTION OF PRICE INCREASE OVER CARCASS

To serve as a concrete illustration in greater detail, let us set up a transaction that is not suggested as an average sample, but would represent a reasonable occurrence. Let us assume that the price of live hogs is to be raised from \$10 to \$14 per hundredweight. As a background, in Table 29 we have set up weights of the parts of the carcass of hogs of different live weights. These are somewhat arbitrary but are reasonably typical, though rather light.

The packer would make quite different disposition of such carcasses, other things being equal. The hams of the heaviest animal would need to be skinned. The shoulders of the heaviest weight would not be adapted to make

“picnics,” as with the lighter weights. In any event, the hams and shoulders would be much heavier in the case of the heaviest animal. The bellies of the heaviest animal would need to go into salt pork rather than into smoked bacon. The loins of the heaviest animal might have to go into mess pork, rather than on the market for fresh pork. With ascending weights, the quality of the lean tends to decline, the amount of fat to increase, the fat trimmings to increase, and the proportions of smoke-cured cuts to decline.

TABLE 29.—PARTS OF CARCASS OF HOGS, FRESH WEIGHTS

Part	Light weight (200 lbs., dressing 136 lbs.)	Medium weight (250 lbs., dressing 185 lbs.)	Heavy weight (350 lbs., dressing 280 lbs.)
Hams	27	32	50
Shoulders	16	27	40
Bacon sides.....	21	25	50
Backs and jowl.....	24	33	45
Loins	14	25	40
Lard	24	32	40
Miscellaneous	10	11	15
Total	136	185	280

It will suffice to focus the illustration on the carcass weights to be found in the center of the table, dealing mainly with a hog of 250 pounds.

If the price of the 250-pound live animal were raised from 10 to 14 cents a pound, this would correspond to a gross increase from \$25 to \$35, or \$10, to be placed upon the 185 pounds of the carcass segregated as above. How would the packer endeavor to distribute this \$10 over the 185 pounds? The different parts would need to be marketed on different price levels; the disposition of the carcass is a joint-product operation in marketing as well as in manufacturing.

To recover the \$10 on the 185 pounds of hog products would correspond to 5.4 cents a pound on the average. The 32 pounds of hams, the 25 pounds of bacon, and the 25 pounds of loins we assume could carry such increase; let us also assume that the 27 pounds of shoulders could carry it. But it is certain that the 33 pounds of back and jowl and the 32 pounds of lard could not carry such increase. If the hams, shoulders, bacon, and loins were to carry all the increase, this would mean distributing the \$10 over 109 pounds, or practically 9.2 cents a pound. It would be going to extremes to assume that the 109 pounds of hams, shoulders, bacon, and loins must carry all the increase, while the 65 pounds of back and jowl and lard would carry none; but it would be going to equal extremes to assume that the 65 pounds of back, jowl, and lard could carry the increase pro rata with the 109 pounds of hams, shoulders, bacon, and loins. Also, the shoulders could not carry as high prices as hams. Suppose the 65 pounds of back, jowl, and lard could carry half the pro rata share, the remainder to be carried by the 109 pounds of hams, shoulders, bacon, and loins. This would mean that the price of hams, shoulders, bacon, and loins would be increased by about 7.6 cents per pound while the price of back, jowl, and lard would be increased by some 2.7 cents per pound.

That the foregoing hypothetical set-up is a reasonable example is made clear by a comparison of the prices of 1924 with those of 1926. As it happens, the price of live hogs in 1926 was a little over \$4 a hundred higher than the price in 1924. Table 30 gives the average wholesale prices of live hogs, hams, bacon, loins, lard, ribs, and mess pork in Chicago, in cents per pound, for the two calendar years 1924 and 1926.

The disproportionate extent to which the increase of 4.2 cents in live hogs was transferred to hams, bacon, and loins, as against lard, ribs, and mess pork, is convincingly

TABLE 30.—WHOLESALE PRICES OF LIVE HOGS AND PORK PRODUCTS
IN CHICAGO, 1924 AND 1926*

Year	Live hogs	Smoked hams	Bacon—short clear sides	Fresh pork loins	Refined lard	Short rib sides	Mess pork
	(Cents per pound)						
1924	8.1	20.2	14.4	19.1	14.7	11.3	13.2
1926	12.3	30.8	20.1	27.8	16.9	15.6	18.0
Increase of 1926 price over that of 1924.....	4.2	10.6	5.7	8.7	2.2	4.3	4.8
Average increase.....		8.3			3.8		
	(Percentage)						
Relation of increase to 1924 price	51.9	52.5	39.6	45.5	15.0	38.1	36.4

* Based on data in Table 31.

illustrated. The lowest price increase in the high-price group—namely, on bacon, 5.7 cents—was more than the highest increase in the low-price group—namely, on mess pork, 4.8 cents. The price of lard was increased only about a fifth as much as that of hams. The average of the increases in the high-price group, 8.3 cents, was over twice as much as the average of the increases in the low-price group, 3.8 cents. Under other circumstances, relative price increases would be distributed somewhat differently than was the case in this concrete example; but what actually happened between 1924 and 1926 illustrates about what one might expect to happen at any time. Since the hypothetical heightened average cost of the live animal, \$4 per hundredweight, is all to be borne by the edible fraction, each part of the dressed carcass would carry what the traffic would bear. This would be for each part a matter of market test, in continuous contest with competitive products from other sources. The tendency

would be, therefore, to have the cuts that are high-priced at the lower price level become still higher-priced at the elevated price level.

If, now, the packer, attempting domestically to market the products from the average hog with an arbitrary price increase of \$10, should tentatively advance the price on all products more or less with different parts in accordance with trade experience (as is illustrated in Table 30), these price advances would provoke reactions all along the line. These reactions would have three results: (1) reduced demand for hog products at increased price; (2) increased demand for competitive foodstuffs and substitutes not burdened with an arbitrary price increase; and (3) subsequently, secondary increase in price of competitive foodstuffs and substitutes.

These changes would proceed until new equations were established at levels that would vary with the different products, and these could not be foreseen. Consumption of one part of the hog might be reduced little at higher price, but with another part so much curtailed as to inhibit application of any price increase to that part. Out of the complexity of market reactions a new equilibrium would be developed that would represent a lowered weighted average consumption of hog products at an indeterminate price increase, and a somewhat increased weighted average consumption of competitive and substitute foodstuffs at an indeterminate increase in price.

THE EQUALIZATION FEE ON LARD AND SALT PORK

Going back to the oft-repeated statement that the difficulties in marketing of hogs lie mostly in the fat and much less in the lean, and scrutinizing the prices of the fat parts and lean cuts, one is led to wonder whether it might not be practicable for the Farm Board and Hog Corporation to direct their price-raising attention exclusively to the fat. We are not fully informed as to the

relative proportions of skeleton, muscle, connective tissue, organs, fat, and hide at the various ages and weights; but, other things being equal, it is known that younger and lighter hogs, especially of early maturing types, contain a much lower proportion of fat than older and heavier hogs.¹ In the half-century before the war, the average weight of marketed hogs declined. This was the result of several factors: change in type, finishing at earlier age, marketing at lower weights, higher proportion of gilts, and lower proportion of sows. The trend toward lighter weights was in the direction of lean and away from fat. Appendix Table III contains the annual average live weights from 1900 to 1930. Monthly average live weights since November 1909 (excluding the years 1914 to 1921) are given in Appendix Table XXI.

Since the war, the average live weight of hogs has been higher than before the war. In the five years before the war the average live weight for the country, according to the *Agriculture Yearbook*, was around 230 pounds; since the war it has been around 240.² These higher weights have represented mostly an added proportion of hog fat to be marketed. While the general trend of live weight of show hogs over 200 pounds has been declining, the general trend of live weight of market hogs has been rising since the war. This rather surprising reversion is in opposition to consumers' taste.

A good way of visualizing the values of the different hog products is to prepare value ratios of hog products with live animals. One finds thus the number of pounds of hams, shoulders, bacon, loins, ribs, bellies, and lard whose value is equal to the value of a hundredweight of hogs. Such ratios, particularly that of live hogs to lard, are commonly used by packers. They must be employed with discretion, with the prices secured from comparable

¹ See below, pp. 633-35.

² Some of this was due to liquidative slaughter during 1923 and 1924.

products. One may use a stated grade of each product and the same grade of live hogs; or one may secure weighted averages for each product and use the weighted price of live hogs. These ratios fluctuate from product to product and from year to year; whenever the price of any particular product goes out of line, this is at once shown in the ratios and is felt in the storage stocks and in the merchandising experience of the packing houses. Table 31 presents a series of these ratios for 1913 and 1914, and since 1921, that are reasonably illustrative of price relations.

Suppose, now, the Board were to determine to pay no attention to the price of live hogs in so far as setting a minimum price was concerned, and to pay no attention to hams, shoulders, smoked bacon, and loins, but were to confine its attention to lard, to the backs and plates of hogs whose hams and bellies have gone into smoked hams and bacon, and to backs, plates, ribs, and bellies of all hogs whose bellies cannot be used for smoked bacon. In short, the Board would direct its attention to the lard and to the fat parts that are marketed as salt pork.¹ The Board would prepare month-by-month ratios and undertake to lift the prices of lard and the various fat parts out of their depressed positions. The proportion of the dressed carcass represented in these fat parts and in lard is not less than 40 per cent and may run over 60 per cent in heavy hogs.

The Board might thus act to levy the equalization fee solely on lard and salted fat parts, and out of the stabilization fund thus secured pay the losses on export of lard and salted fat parts. The effect would be to create a terminal market premium on animals poor in fat and a discount on animals rich in fat, other things being equal.

¹ See specifically paragraphs No. 1421, 1422, 1423, 1424, 1425, 1426, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1453, 1455, *Annual Reports of the Chicago Board of Trade*.

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TABLE 31.—WHOLESALE PRICES AND RATIOS OF LIVE HOGS AND VARIOUS PORK PRODUCTS, 1913-14 AND 1921-30*
(Cents per pound)

Year	Live hogs	Smoked hams	Bacon—short clear sides	Fresh pork loins	Short rib sides	Mess pork	Refined lard
1913.....	8.35	16.6	12.7	14.9	11.1	10.8	10.8
1914.....	8.30	16.7	13.2	15.4	11.1	10.5	10.2
1921.....	8.51	26.8	13.5	22.5	9.6	10.6	13.2
1922.....	9.22	26.5	14.1	21.7	11.2	12.3	13.1
1923.....	7.55	21.2	12.0	18.0	9.8	12.0	13.9
1924.....	8.11	20.2	14.4	19.1	11.3	13.2	14.7
1925.....	11.81	27.1	22.3	25.0	17.0	18.9	17.9
1926.....	12.34	30.8	20.1	27.8	15.6	18.0	16.9
1927.....	9.95	24.6	18.7	23.9 ^a	13.3	16.3	13.7
1928.....	9.22	22.8	16.3	22.0 ^a	12.4	15.1	13.3
1929.....	10.16	24.4	17.1	24.0 ^a	12.4	15.8 ^b	13.0
1930.....	9.47	23.0	16.6	22.2 ^a	13.6	....	12.0

RELATION OF PRICES OF VARIOUS PORK PRODUCTS TO PRICES OF LIVE HOGS (Percentage)							
1913.....	100	199	152	178	133	129	129
1914.....	100	201	159	186	134	127	123
1921.....	100	315	159	264	113	125	155
1922.....	100	287	153	235	121	133	142
1923.....	100	281	159	238	130	159	184
1924.....	100	249	178	236	139	163	181
1925.....	100	229	189	212	144	160	152
1926.....	100	250	163	225	126	146	137
1927.....	100	247	188	240	134	164	138
1928.....	100	247	177	239	134	164	144
1929.....	100	240	168	236	122	156	128
1930.....	100	243	175	234	144	...	127

* Based on data supplied by the U.S. Department of Agriculture and data from *Agriculture Yearbooks*, 1927, p. 1018, 1928, pp. 930 and 936, and 1930, p. 859, and from U.S. Bureau of Labor Statistics, *Wholesale Prices of Commodities*, December 1929, p. 3, and December 1930, p. 3, except the prices of short rib sides and mess pork, which were secured from the *Daily Trade Bulletin* (Chicago), 1913-14, and the *Annual Reports* of the Chicago Board of Trade, 1921-30. Price of mess pork converted from dollars per barrel to cents per pound on basis of 190 pounds to a barrel from October to February and 193 pounds to a barrel from March to September.

^a Quotation for loins, 8-10 pounds. ^b Three months only (January-March).

The packers, paying out the fee levied on lard and fat pork, would charge this back on growers by lowering purchase prices on hogs heavy in lard and fat cuts. The fee would represent a discount on heavy animals. There would be a reward for marketing light hogs. That the assessment and collection of the equalization fee would be intricate and difficult under these circumstances need not be taken up here; intricacy and difficulty will be present no matter how the fee is applied.

Two questions arise: What would be the reaction on the consumption of lard and fat pork and on the prices of lard substitutes? Secondly, what would the Board do with the surplus of fat pork? Some reduction in domestic consumption of lard and fat pork would be expected. The consumption of lard and salt pork is world-wide; they have long been staples for peoples even of low standards of living. A large proportion of our present export of lard and fat pork goes to countries of low standards of living. These markets could be expanded at lower prices. The Board would have no alternative but to sell the surplus lard and salt pork at whatever prices they would fetch throughout the world and pay the losses out of the equalization fund. This, however, would seem to be the simplest way to pay export losses on hog products. Finally, the plan would have the advantage of putting a premium on quality.

EFFECTS ON PRODUCTION OF HOGS

So far as the simple case is concerned, it will not be disputed that higher hog prices tend to stimulate production of hogs. Also, since higher retail prices of hog products would tend to check consumption, an additional indirect effect would be increase in the exportable surplus. In the event of higher hog prices, therefore, the exportable surplus would be directly increased through expansion of production and also indirectly increased

through contraction of domestic consumption. The operation of the plan would tend so to expand production of hogs as to flood the domestic market with pork in competition with beef and lamb and next expand the surplus fraction so as to tend to drive down world prices.

Proponents of the measure, however, insist that the equalization fee could be adjusted so as to restrain hog production. It is reasoned that the larger the production, the larger the exportable surplus and the higher the equalization fee: therefore, the mounting fee would warn farmers against added production. It seems to us that, if the net increase in farm prices were at all substantial, production would tend to be directly stimulated.¹ If hogs had been selling for \$10 and the price were set at \$14 and the equalization fee at \$1, the price of \$13 might not stimulate production as much as \$14; but it would stimulate production as against the price of \$10. Farmers would judge the prospective profits on hogs by the hog price directly and by the corn-hog ratio indirectly, not by the equalization fee. They have brought about many cycles through misguided breeding and they would do so again with a policy of higher price and in possession of higher price. Barring unusual prevalence of infectious diseases, the count in swine is easily and rapidly increased by breeding expansion directly under the control of farmers. Almost within one year, farmers can convert shortage of hogs into glut; that is why the United States Department of Agriculture has developed the official surveys of intentions to breed. Few crops are so directly under the control of the farmer as the pig crop. A substantial increase in price would encourage breeding; repression, if attain-

¹The probability of expansion has been conceded by Chester C. Davis ("Hogs and Corn in the Export Plan," *Wallaces' Farmer*, April 1, 1927, p. 14), in the following words: "There is excess packing capacity in the United States, and an opportunity to utilize it in processing for export sales would be an advantage if the total number of hogs increased on an average thru the years in which the plan operated, as it probably would."

able at all, would lie not in the equalization fee, but in choice and enforcement of policy by the Farm Board.

Whenever a heavy slaughter of hogs takes place, it is necessary to inquire whether this is the result of breeding or of liquidation. Liquidation of the herd cannot of course be long maintained. It is possible to form an opinion by the relations that hold between the number of swine and the number of swine slaughtered. Appendix Table II contains figures for the estimated number of swine on January 1 and the slaughter of swine during the calendar year, with the ratio of slaughter to number of swine. On account of lack of reported slaughter prior to 1900, the series does not extend earlier than that date.

To much stress is not to be laid on these figures. The reported estimate of numbers of hogs is not regarded as a particularly trustworthy estimation; the annual figure for slaughter includes nothing more than an intelligent guess on rural slaughter. Furthermore, the proportions of pigs farrowed before and after the first of January is not constant from year to year. Also, the ratio of slaughter to death from natural causes does not remain equal from year to year. But with full allowance for errors and incomparability, the series of ratios is suggestive.

Before the war, the ratio of the hogs slaughtered to the total number of hogs was below 100 until 1913 and 1914, when the ratios were 102.1 and 103.6, respectively. Since 1920, the ratio has been persistently rising, from 102.9 to 126.5. Interpreting the ratios during recent years in the light of changes in animal husbandry, it seems clear that the increase in slaughter is due to more rapid turnover, with increase in the average number per litter and reduction in the average age at slaughter. The flood of hogs that came to slaughter in 1923 and 1924 was the outturn of the period between the fall of 1921 and that of 1923. This expansion of slaughter was not the outcome of a war expansion of hogs, since the number on January 1,

1920, was only 62.6 million and the slaughter in 1920 and 1921 did not rise to 63 million. During 1923 and 1924 close to 80 million hogs were slaughtered annually. This slaughter was to some extent due to liquidation, but for the most part it consisted of pigs born after the spring of 1922. When one considers the number of hogs in the country on January 1, 1910, and thereafter, and the slaughtering from 1914 to 1920, and thereafter, one obtains a clear idea of the expansibility of hog production.

Under operation of the equalization fee, the export of hog products would be a relatively riskless operation for packers. The packers naturally would hope for large exports; the hog raisers and the political proponents of so-called equalization of agriculture with industry would also hope for large exports. The packers would favor capacity operations; the farmers would favor capacity operations for their own reasons. With the mercantilist viewpoint all along the line, and with hog raisers and packers convinced that exports in themselves are a national good, one can hardly picture the Farm Board interposing objection and fixing a maximum figure for hog exports. If exporting a billion pounds is a national good, can exporting 2 billion pounds be anything but a national "better"? The limit would not be reached until the consuming public refused to follow and hog products in storage accumulated to the bursting point. This all would mean increase in the supply of hogs. If an artificially high hog price were to be established, according to past experience, hog breeding would boom again.

Some of the proponents of the plan have endeavored to evade this consequence by assuming that the exporting packers would be organized into one export corporation under the Webb-Pomerene Act, and that domestic and foreign operations would be pooled and controlled in the accounting of the packers. No check would lie in organization of exporters under an export corporation.

The packers would buy the hogs on an agreed range of prices. They would have cost figures (joint and separate costs), as they have now, for the various products currently passing into storage. Such of these products as went into export would be sold at a loss directly determinable from the cost sheet, with addition of merchandising expense. For the remainder, the packers would supply the domestic markets on a separate accounting. If exports were controlled, this would react on acceptance of receipts at terminal stockyards.

If an effective hog raisers' co-operative association existed in the corn belt in possession of adequate semi-annual surveys of intentions to breed, with subsequent check-up on the pig crop, such an organization ought to be in a position to exercise some control over production. But the co-operative system existing in Denmark, effective as it is, has not yet shown itself capable of checking the cycles of hog production.

We conclude, therefore, that hog breeding and production of hog products would be expanded until checked (at some indeterminable point that would vary from year to year) by limitation of the domestic demand for hog products and by the declining price level of domestic hog products sold in foreign markets. The packers would have no incentive to check operations for domestic or export trade. Farmers, so long as they had the corn and the breeding stock, would find within their own operations no accustomed incentive for repression. So long as the scheme worked (i.e., raised hog prices), the equalization fee could not be expected to lower effectively the attraction of higher prices. Hog raisers would follow their established custom of trying to join high production to high prices.¹

¹ Discussing the influence of price on acreage, in relation to the equalization fee, J. D. Black makes the following observation in his book on *Agricultural Reform in the United States*, p. 245: "There is much point to the

REGIONAL EFFECTS ON PRODUCTION

Higher prices of hog products might have important regional effects. A rough idea of the consumptive relations of the populations of the individual states to hog production in those states is to be obtained by comparing in each state the population with the number of hogs. The estimate of hogs is always much less accurate than the enumeration of the human population. From these figures we secure ratios of swine population to human population as given in Table 32, in which we employ the data of the fourteenth and fifteenth decennial censuses.

To classify the states let us devise a rough rule. All states containing over 50 hogs per 100 people we may regard as hog-surplus states; those containing less than 50 hogs per 100 people are regarded as hog-deficiency states. States near the border-line must not of course be arbitrarily treated, since the hog estimates were not equally representative for all states and in any state the count varies from year to year; also, the carcass dressing outturns of hogs have varied from state to state. But with all qualifications, the ratios are informative.

The states may be divided into four groups, assuming that the people in each state enjoy the national average per capita consumption of hog products. Hog products are extensively shipped in interstate commerce, because the location of packing houses does not correspond to

statement that a good part of the response observed when single crops are studied is the result of shifting from one crop to another. But there are two answers to this. One is that most areas in the United States produce only one important farm product for export. Much of the Corn Belt really has only one; likewise of the Cotton Belt. If the equalization fee really raised cotton or corn and hog prices appreciably, there would be a shift to these products without encroaching on the area for any other export product except wheat in some states. In Kansas, Nebraska, and Indiana, wheat and corn acreage would divide the effect of the stimulus; in Oklahoma and Texas, wheat and cotton. In the spring-wheat region, the stimulus would be shared by wheat, flax, and rye. The other answer is that new land could easily come into crop use, and more product could be obtained from the same area. A reasonable judgment in this point is that more land would come into crops."

the concentration of hog raising or of population. In 1920 twenty-seven states had less than the ratio of 50 hogs per 100 people; in 1930 there were thirty-six. These are varyingly deficient; very deficient are Massachusetts, Rhode Island, Connecticut, New York, and New Jersey. In 1920 there were seven states with over 50 but under 65 hogs per 100 people, which may class them as merely self-sufficient or producing a slight surplus; in 1930 this group had decreased to four states (Illinois, Montana, Wyoming, and Idaho). In 1920 there were seven other states which had over 65 but under 80 hogs per 100 people, or a significant surplus; in 1930 there were no states in this group. Finally, there were eight states that had heavy surpluses in 1930; of these, seven also had heavy surpluses in 1920, as follows:

	Hogs per 100 people on January 1	
	1920	1930
Indiana	128.2	81.4
North Dakota	70.8	100.0
Missouri	114.2	105.0
Minnesota	99.7	148.6
Kansas	98.0	150.2
Nebraska	265.1	369.1
Iowa	327.1	406.4
South Dakota	306.8	420.5

It is significant that South Dakota, on account of lack of urban population, has a large surplus of hogs, over 420 per 100 people. In the group having 50 or less hogs per 100 people, the Southern states are predominately represented.

The area of the corn belt is contributed mostly by Indiana, Illinois, Iowa, and Nebraska, of whose combined area the largest part lies within the corn belt; peripherally the corn belt includes portions of Ohio, Michigan, Wisconsin, Minnesota, South Dakota, Missouri, and Kansas, the largest part of whose combined area, however, lies

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TABLE 32.—POPULATION AND NUMBER OF HOGS ON FARMS, AS OF JANUARY 1, 1920, AND JANUARY 1, 1930*

State	Population (thousands)		Number of hogs (thousands)		Hogs per 100 people	
	1920	1930	1920	1930	1920	1930
Maine	768	797	91	47	11.8	5.9
New Hampshire.....	443	465	42	18	9.5	3.9
Vermont	352	360	73	30	20.7	8.3
Massachusetts	3,852	4,250	104	90	2.7	2.1
Rhode Island.....	604	687	19	5	2.2	.7
Connecticut	1,381	1,607	61	23	4.4	1.4
New York.....	10,385	12,588	601	232	5.8	1.8
New Jersey.....	3,156	4,041	139	72	4.4	1.8
Pennsylvania	8,720	9,631	1,191	615	13.7	6.4
Delaware	223	238	39	23	17.5	9.7
Maryland	1,450	1,632	306	189	21.1	11.6
Virginia	2,309	2,422	941	520	40.8	21.5
West Virginia.....	1,464	1,729	305	173	20.8	10.0
North Carolina.....	2,559	3,170	1,271	803	49.7	25.3
South Carolina.....	1,684	1,739	845	390	50.2	22.4
Georgia	2,896	2,909	2,071	1,154	71.5	39.7
Florida	968	1,468	755	490	78.0	33.4
Ohio	5,759	6,647	3,084	2,078	53.6	31.3
Indiana.....	2,930	3,239	3,757	2,637	128.2	81.4
Illinois	6,485	7,631	4,639	4,204	71.5	55.1
Michigan	3,668	4,842	1,106	630	30.2	13.0
Wisconsin	2,632	2,939	1,596	1,361	60.6	46.3
Minnesota	2,387	2,564	2,381	3,810	99.7	148.6
Iowa	2,404	2,471	7,864	10,041	327.1	406.4
Missouri	3,404	3,629	3,889	3,810	114.2	105.0
North Dakota.....	647	681	458	681	70.8	100.0
South Dakota.....	637	693	1,954	2,914	306.8	420.5
Nebraska	1,296	1,378	3,436	5,086	265.1	369.1
Kansas	1,769	1,881	1,733	2,826	98.0	150.2
Kentucky	2,417	2,615	1,504	661	62.2	25.3
Tennessee	2,338	2,617	1,832	741	78.4	28.3
Alabama	2,348	2,646	1,497	804	63.8	30.4
Mississippi	1,791	2,010	1,373	620	76.7	30.8
Louisiana	1,799	2,102	851	415	47.3	19.7
Texas	4,663	5,825	2,226	1,028	47.7	17.6
Oklahoma	2,028	2,396	1,304	1,008	64.3	42.1
Arkansas	1,752	1,854	1,378	708	78.7	38.2

* Data from *Fifteenth Census of the United States, 1930 Population Bulletin* (First Series), p. 4; *Agriculture Yearbooks, 1921*, p. 723, and *1931*, p. 844.

TABLE 32 (Continued)

State	Population (thousands)		Number of hogs (thousands)		Hogs per 100 people	
	1920	1930	1920	1930	1920	1930
Montana	549	538	167	302	30.4	56.1
Wyoming	194	226	72	117	37.1	51.8
Colorado	940	1,036	450	495	47.9	47.8
New Mexico.....	360	423	88	73	24.4	17.3
Arizona	334	436	50	19	15.0	4.4
Utah	449	508	99	70	22.0	13.8
Nevada	77	91	27	23	35.1	25.3
Idaho	432	445	240	255	55.6	57.3
Washington	1,357	1,563	265	182	19.5	11.6
Oregon	783	954	267	195	34.1	20.4
California	3,427	5,677	909	570	26.5	10.0

outside of the corn belt. In the corn belt is not only the highest ratio of hogs to population, but the most rapid turnover of hogs. Indiana, Iowa, and Nebraska, with only 7.1 million inhabitants, had over 17 million hogs in 1930.

Functionally a part of the corn belt are the cities located close by and receiving large shipments of live hogs from the belt; Buffalo, Pittsburgh, Detroit, Cleveland, Cincinnati, Louisville, Milwaukee, South St. Paul, Denver, and Wichita. From the corn belt flows peripherally a stream of live hogs, refrigerated carcasses and cuts, cuts in pickle, cuts in finished cure, barreled pork, dry salt pork, sausage and other canned and ready-to-eat products, and lard. Broadly considered, the prices of hog products in the peripheral deficiency area ought to correspond to prices in the corn belt, plus outward-bound freight and other carrying charges, modified by circumstances of local competition.

In each state lying outside of the corn-and-hog belt is the impulse to make the state self-sufficient in hog products, or at least less dependent. The departments of animal husbandry in the state agricultural colleges, extension

services, breeders of purebred stock, farmers specializing in animal husbandry, farmers engaged in diversified agriculture, and local producers of feedstuffs, all endeavor to stimulate hog production. Also, local processors desire to enjoy the added value of manufacture. This policy of self-sufficiency proceeds from commercial incentive and is based upon the conviction, or hope, that with proper management it would be possible locally to produce hogs at a lower price than the corn-belt price plus transportation and carrying charges; transportation costs are thus set against comparative advantage. But in spite of these efforts, in most deficiency states the ratio is declining.

California may be cited as an illustration. With a growing population, the state is a heavy net importer of hog products. Diversified agriculture and animal husbandry are preached in the interest of balance with fruits and vegetables. The hog is prized as a serviceable scavenger of residues on fruit and vegetable ranches. Corn does not do well in California, but barley and oats are widely grown and alfalfa does especially well; there is a heavy milk production. Therefore, California could imitate the practices of Denmark and Canada and raise hogs with alfalfa, small grains, and skim milk. The agricultural leaders of the state have demonstrated the feasibility of raising high-grade pork, and the farmers of the state resent having green bellies shipped in from the corn belt to be cured in packing houses in California.

The corn-and-hog belt is thus seen to occupy the following position. Centrally located, it raises hogs out of all proportion to the needs of the population of the area. Surrounding the corn belt is a deficiency area (varying in degree), including close to three-fourths of the population of the country.¹ Even the customary needs of the population in the deficiency area (as a unit) are exceeded

¹ A state may be a surplus producer, and still depend largely on shipped-in hog products.

by the surplus production of the corn-and-hog belt, leaving a varying amount still to seek markets in foreign countries. Production in the corn belt varies; production in the deficiency area outside of the corn belt varies, with agriculture in the deficiency states endeavoring to make those states less dependent on shipped-in hog products. If, now, prices of hog products were substantially raised, under a policy of higher price, this would tend to stimulate efforts in the peripheral deficiency states to make themselves less dependent on the corn-hog belt. The increased production of the deficiency states would tend to become established agricultural practice, and after a few years the corn-hog belt would find itself with relatively less domestic market and relatively still more dependent upon export trade. The higher the hog prices, the more the comparative advantage of the corn belt is obscured, resulting for the corn belt in a relative contraction of the domestic market. A program of contraction of acreage planted to wheat and cotton is likely to carry ominous implications for the corn belt.

We may summarize the inevitable effect of higher hog prices on production if farmers followed their accustomed incentives. With the policy of higher price and the attainment of higher price, breeding would be expanded, the acreage of corn extended, and other adaptations made to secure the necessary volume of feedstuffs. This would occur in the corn belt where hogs are the outstanding cash crop. It would occur also outside of the corn belt, since higher prices would obscure the comparative advantage of the corn belt and make local production attractive. The rapid rate of turnover in raising hogs makes rapid expansion easy. The inevitable consequence would be a glut of live hogs in the terminal stockyards, as was the case in past cycles and especially in 1923-24. We do not believe that the height of the equalization fee would

act to restrain production (in the corn belt or outside of it) in contravention of the accustomed incentives.

EFFECTS OF HIGHER PRICE ON CONSUMPTION¹

Ardent proponents of the equalization fee have tried to believe that the farm price of live hogs could be raised substantially without the retail prices of hog products being raised substantially. In view of the wide spread between producer's price and consumer's price, they have suggested that packing houses and middlemen would absorb the increase in price of live hogs in order to avoid contraction of volume of trade as consequence of higher retail prices on consumption. Some ardent opponents of the equalization fee have tried to believe that retail prices of hog products would be raised substantially without the prices of live hogs being raised significantly. Both positions are extreme; but it is safe to infer that increase in price of hogs would be passed on to ultimate consumers. Since many middlemen conduct business on a percentage basis, the increase in price of a raw material is likely to be somewhat expanded when the finished goods reach the consumer; this is especially true in prosperous times. On the other hand, circumstances exist under which middlemen and retailers absorb some of the increase, on the ground of supposed self-interest; this is especially true in hard times. It will be safe to consider the effect of the equalization fee on production and consumption on the predication that increase in farm price of live hogs will be passed on to consumers.²

We deal here with expert observation and trade judgment rather than with statistics. It is agreed that con-

¹ We have found it convenient to bring into this chapter the discussion on consumption of hog products that might have been expected in chapter v.

² Compare H. A. Wallace, *Agricultural Prices*; E. N. Wentworth and T. U. Ellinger, "The Determination of Hog Prices at Public Markets," *Journal of Farm Economics*, July 1924, VI, 279-82; S. Wright, *Corn and Hog Correlations* (U.S. Department of Agriculture Bulletin 1300), January 1925.

sumption of (demand for) pork is sensitive to price. This is held to be true for meats as a class; but it would hold for pork particularly, if the price of pork were to be artificially raised above the current prices of beef, mutton and lamb, poultry and eggs. Contrasted with cereals and legumes, meats are expensive in terms of calories. During prosperity, the consumption of meat increases; during hard times, less meat is used. With income constant, higher prices for meat reduce purchases. These general observations are accepted on both sides of the farm relief discussion. At the same time, we are not convinced that small changes in prices of hog products cause significant fluctuations in consumption.

In chapter iii we discussed the unsatisfactory state of our information on the supply of hog products.¹ The data are collected in Appendix Tables II, III, and IV. Since data on consumption consist principally of disappearance of supply, our lack of even approximate information on this point and especially our assumptions in respect to slaughter on farms make impossible a satisfactory discussion on variation in consumption of hog products.

According to the figures for per capita consumption of dressed meat and lard given in Appendix Table IV, wide fluctuations occur from year to year. These fluctuations appear in the totals and also in the figures for pork and lard. They include variations in marketing, possibly in stocks and changes in consumption; but they also must include errors introduced with the unverifiable figures for slaughter of animals outside of federal inspection. We are not convinced that the first year, 1907, or the years 1907-11, can be accepted as a trustworthy base-line. We do not feel that calculating the data back to 1900 has provided us with a more trustworthy base-line. We are not convinced that meat consumption declined from 1907

¹ See above, pp. 81 ff.

to 1914 in the fashion and from the base-line suggested in the table; nor are we convinced that it rose from 1919 to 1924, and declined thereafter in the fashion and from the base suggested in the table. From the beginning of the century to the outbreak of the war, we infer that per capita consumption of pork was fairly constant, while the sum spent for pork was increasing.

Entirely apart from the uncertainty introduced in judging the volume of slaughter outside of federal inspection, there are reasons for withholding definitive views on level and trend of meat consumption at least until after reports of the fifteenth census and the subsequent biennial census of manufactures become available. One cannot judge the trend of per capita meat consumption directly from per capita livestock production, because of the more rapid turnover resulting from marketing lambs instead of sheep, baby beeves instead of mature steers, younger instead of older hogs, and, in general, the increase in proportion of the crop of the newborn brought to market maturity. Also, the subject of waste requires re-appraisal.¹

How little we are in position to make close inferences on probable consumption of hog products under changes in prices will be fully realized only when one attempts to get a picture of the average retail prices of hog products. These vary from region to region, from grade to grade, and from time to time. We possess no correlations between retail prices and consumption in any region. We have a general notion of the proportion of the income and the absolute amount of money spent for foodstuffs. But we know little of the outlay spent for all meats, or of the relation of the amount spent for pork products to the total outlay for all meats.

Whatever the level of consumption of hog products

¹ Cf. R. J. McFall, *The World's Meat* (New York, Appleton & Company, 1927).

in the United States, it is high compared with that in most other countries. Per capita consumption before the war was estimated at about 38 pounds per year in the United Kingdom¹ and about 75 pounds in Germany.² The present consumption is higher in Great Britain and lower in Germany than before the war. Clearly, therefore, in the United States we are dealing with a high level of consumption of hog products.

According to Appendix Table IV, the average pork and lard consumption for the years 1900-13 was 73.6 pounds; the highest figure was 79.6, the lowest 68.5. The average of the ten years 1921-30 was 83.5 pounds, the highest was 90.1, the lowest 74.8 pounds. During the years 1921-24 prices were low. The low figures for consumption for 1920 and 1921 might have been the expression of unemployment during that time, with the high figures for the years 1923 and 1924 the result of recovered prosperity. Pork prices rose sharply in 1925, and consumption declined. The reactions look true as to direction; it is as to extent that we have no certainty. In attempting to measure consumption with the use of figures for production under federal inspection, it seems to be assumed that the relations between the distribution of federally inspected hog products and those outside of federal inspection remain relatively constant from year to year, which we feel is unwarranted.

In 1920 Raymond Pearl issued a statistical measurement of the nation's food supply (*The Nation's Food*). The methods used by Pearl and those employed by the Bureau of Agricultural Economics of the United States Department of Agriculture are not identical. Pearl used a constant ratio of slaughter under federal inspection to

¹T. B. Wood, *The National Food Supply in Peace and War* (Cambridge, England, 1917), pp. 3-4.

²*Die deutsche Volksernährung und der englische Aushungerungsplan* (Braunschweig, Germany, 1915), p. 52.

total slaughter; the official report uses a variable ratio. Different ratios of dressed weight and of edible offal to live weight have been used. The official report has an adjusted estimate of lard separate from pork, while Pearl estimated them together. Pearl retained an estimate for edible offal, while in the official report edible offal is canceled out against waste in bone and trimmings. Adjustment for imports and exports was the same. There are other differences in the two procedures which need not detain us. Pearl's figures for edible hog products available for consumption in the country are substantially higher than those of the Bureau of Agricultural Economics. Comparing Pearl's estimates for the three fiscal years 1911-14 with the estimates of the Bureau of Agricultural Economics for the calendar years 1911-13, we find the estimate for annual per capita consumption substantially higher in Pearl's compilation. The differences are indicated in the following tabulation, which given the data for production in million pounds:

Item	Estimates of Bureau of Agricultural Economics			Estimates of Pearl in <i>The Nation's Food</i>		
	1911	1912	1913	1911-12	1912-13	1913-14
Production of						
Pork	6,596	6,407	6,622	9,451	9,218	8,809
Lard	1,673	1,626	1,681			
Edible offal			
Total	8,269	8,033	8,303	10,185	9,934	9,493

There is no purpose in attempting to reconcile these differences. We are convinced that the estimates of Pearl are too high, without accepting the view that the official estimates are correct. The discrepancy is only another illustration of the insecurity in our available estimates of the per capita consumption of hog products.

Convinced that we now possess no statistical material with which to measure changes in consumption of meats

from year to year, what is there of a qualitative nature to be said bearing on the per capita consumption of hog products? During recent years we have apparently witnessed an increase in the consumption of fresh pork. The consumption of ham and bacon has perhaps been maintained. The consumption of hog fat, including lard and the cured fat parts of lard-type hogs, has probably been reduced.¹

This last inference does not agree, so far as lard is concerned, with the report of the Bureau of Agricultural Economics, according to which the per capita consumption of lard during the past five years has been larger than before the war.² This we are unable to harmonize with the current use of lard substitutes and vegetable oils; we surmise the figure for increase is fictitious. Also, the outturn of salt pork has declined, and this must be set against the figures for lard consumption. According to the Bureau of Agricultural Economics, per capita lard consumption has risen during the past twenty years, using 5-year averages, from 11.4 pounds in 1909-13 to 14.0 pounds in 1926-30. But in the same time, the relation of lard to total pork and lard produced under federal inspection has risen from 20.2 to 22.5 per cent.³ In short, lard is now a somewhat larger fraction of the hog fat than used to be the case, but salt pork is a smaller fraction. The question is not whether lard consumption is increasing but whether consumption of hog fat is increasing. It seems to us certain that the per capita consumption of hog fat is decreasing, although the amount of hog fat in the form of lard may have increased somewhat. The figures themselves are untrustworthy because they assume

¹ Manufacturers of ready-to-eat canned hams are now advertising that less than half of a raw ham is edible, with the surplus fat consisting of over a fifth of the original weight.

² See Appendix Table IV.

³ See Appendix Table III.

that hogs killed outside of federal inspection have the same composition as federally inspected hogs; but the real point concerns the use of trimmings and the decline in the use of fat backs and such salted cuts, which now go more into rendering. A generation ago most of the immigrants from northern Europe were familiar with the use of lard as a spreading fat for bread and were accustomed to use mess pork in the cooking of vegetables and as a dish. Also, salt pork was a staple in the lumber camp, on the range, and in the mining camp. Now the descendants of immigrants spread butter on bread and use little salt pork in the preparation of vegetables or as a meat. Pork and beans are a specialty of food-packing houses, but have retreated in the diet with disappearance of frontier life and decline of exposed and arduous occupations.

But whether actual consumption of hog products is as high as the figures given, or lower in the direction of our conjecture, in any event it is high and therefore susceptible to reduction in response to increase in price. If the price of hogs were raised, the increase, as previously explained, could not fall proportionately on all parts of the carcass; the packers would apportion the increase where they thought the traffic would bear it. It is safe to infer that lard and the cured fat parts could stand little increase; most of the increase would have to fall on cured hams and bacon and on fresh pork, particularly the choicer grades.

Could cured hams and bacon and fresh pork carry the burden of a substantial increase in the price of hogs? The question resolves itself into the reactions that consumers might be expected to display if the retail prices were raised substantially above the current level. The public would find pork prices out of line with prices of other foodstuffs. The first reaction would be to turn from pork to other meats. Prices of other meats would then

tend to rise. The second reaction might be to reduce the consumption of all meats. Ham is already close to the class of poultry, and higher prices would favor the use of poultry. Shoulders, commonly called picnics, are regarded as inferior ham and at higher prices would be comparably still less attractive. In public eating-places the price of the portion of ham and bacon would be increased or the size of the portion reduced; in either case, consumption would be lowered. In the event of higher (responsive) prices of beef, mutton, and lamb, higher hog prices would therefore mean absolute and relative reduction in pork consumption, and absolute reduction in consumption of meat.

The food uses of lard fall into three groups: in the preparation of vegetables, as a cooking fat, and as a shortening agent. In this country lard is now little used in salad dressing or as a spreading fat for bread.¹

1. Lard is widely used as a flavoring fat in the preparation of vegetables, most of which are unpalatable if cooked without the addition of some fat or oil. Vegetables like cabbage and spinach are unsatisfying without fat; during the war, Germans learned that sauerkraut is more important as a fat carrier than as a vegetable. Salt pork (backs, ribs, bellies, butts, jowls, ends of hams and shoulders, and nubbins of bacon) is for most dishes superior to lard, and the added tissues of the meat make a contribution to the dish. Canned beans could be prepared with lard to have the same caloric value as pork and beans; but the presence of a visible piece of meat appeals to the consumer. Vegetable oils are equally adapted to the seasoning of vegetables, some of them contributing less flavor than lard, olive oil more. These fat and oil flavors are matters of taste, northern Europeans preferring lard, southern Europeans preferring vegetable oil.

¹ Commercial lard suffers from a merchandising defect, lack of uniformity. No other kitchen or table fat is so un-uniform.

Beef tallow and mutton tallow do not lend themselves well to the preparation of vegetables, despite the esteemed flavor of beef, mostly on account of the high melting point; the fats congeal on the surface as the dish cools. Canned vegetables containing high-melting-point fats, when opened cold, present an unattractive appearance.

Among the several fats and oils, lard finds a place depending on the custom of the country and the tastes of the consumers. If the price of lard (and salt pork) were artificially raised in relation to the other oils and fats, some housewives would continue to use lard despite higher price; other housewives would shift to cheaper fats. Packers of prepared foodstuffs pay more attention to price changes than do housewives; also, the kitchens of public eating-places would be expected to modify their practices more than would households. There can be little doubt that a substantial increase in the prices of lard and salt pork would tend to bring about widespread substitution of other fats and oils for lard and salt pork in the cooking of vegetables.

2. Despite the reputation for indigestibility, the frying of foodstuffs seems on the increase; so-called deep frying is the best illustration. Lard is widely used for frying, but is being subjected to continuously more severe competition by vegetable oils and vegetable lard substitutes.¹ Points of demonstrable superiority lard does not seem to possess. If the price of lard were artificially raised out of line with the other cooking fats, this would result in some

¹ "Lard, apparently, is being pushed more and more out of the market by vegetable oil substitutes. The packers would like to start a campaign of education concerning the merits of lard, but they hesitate to do so because lard varies so much in its quality from time to time, depending on the kind of hog which produces the lard."—Editorial in *Wallaces' Farmer*, December 28, 1929, p. 5. Up to 1930, the federal regulations on refining and processing of lard were very strict, unreasonably so and without technical justification, when contrasted with the latitude accorded to refiners in the processing of butter and vegetable oils. This discrimination has recently been corrected and henceforth American lard ought to be better grade and in particular more uniform than was previously the case.

substitution in the home, in public eating-places, and in shops. Olive oil is in a higher-price class; but the oils of cottonseed, peanut, corn, palm, soy bean, or other seeds, or their (hydrogenated) preparations (even coconut oil), provide widely used substitutes for lard on the price basis. For this particular use, lard could probably stand the least increase in price.

3. Lard is a widely popular shortening agent. There is a large element of custom and empiricism in shortening; the chemistry and physics of the reaction are poorly understood. In this country, olive oil is rarely used as a shortening agent; but oleo oil, cottonseed, peanut, corn, and coconut oils, and vegetal lard compounds are widely used. In the making of bread, biscuits, and crackers (whether in the home, bakery, or public eating-place), the price of the shortening agent is important; in the making of higher-priced pastries and cakes, the price of the shortening agent is less important or may be disregarded. With cakes and pastries, butter is most highly esteemed and margarine widely used. If the price of lard were artificially raised, this would lead to substitution in the making of bread, biscuits, and crackers to much greater extent than in cakes and pastries. Many housewives and bakers would decline to risk the outcome of a batch of bread or a cake to make a small saving on lard. Large bakeries, however, would experiment with different oils and fats in order to practice riskless substitution. Gradually, Americans are learning to use other shortening agents than lard; in many homes and bakeries no lard is used at all. On the whole, however, substitution on the basis of price would be less likely to occur (at least on a large scale) with the use of shortening in baked goods, especially sweets, than with the use of fat in frying.

The available statistical data do not enable us to forecast a trend in fat consumption, but a survey of the dietary serves to give some indication. With continuing

substitution of machines for manual labor and the continuing opposition of medical opinion and fashion to overweight, we must expect further diminution in the per capita ingestion of food in terms of calories. The intake of cereals has probably sunk close to the minimum level. Intake of low-calorie fruits and vegetables tends to increase. Also, the intake of dairy products and of sugar tend to increase, for different reasons. Lean meats receive continuously more pronounced preference. Apparently, it is the oils and fats which must yield. We fancy the use of butter will be maintained, and the use of salad oil and mayonnaise is apparently increasing. Clearly, therefore, it is the slaughterhouse fats which must bear the brunt of the prospective reduction in per capita intake of food in terms of calories. The position of lard is less vulnerable than those of the tallows of cattle and sheep; but it is hard to see how the present per capita intakes of the three fats can be maintained.

Of the nature of the consumer's reaction there can be no doubt; it is only a question of the extent, and on this no one can have other than an expert's guess. People seem to care little about the price of bread; they care more about the price of meat. Also, to single out pork products for price increase out of line with other meats would arouse antagonism on the curb and over the counter.

We take it, moreover, that increases in price of hog products of all kinds, through the equalization fee, would lead to increase in price of beef products, mutton and lamb, and poultry to a varying but indeterminate extent. Hog products represent about 16 per cent of the calories of our diet; the other named foodstuffs represent about 12 per cent. An arbitrary increase in the price of hogs would, therefore, other things equal, result in increase in the price of protein foodstuffs representing 28 per cent of the calories of our diet. Also, this might extend to

dairy products to some extent, since in some ways animal fats are competitive with milk in the preparation of food.

In the effect of the price of hog products on consumption, much would depend upon the continuation of prosperity. Meat in this country is a commonplace food, not a semi-luxury; but pork beyond a liberal ration is not a necessity. The data suggest annual variations up to 10 pounds during recent years.¹ If an annual fluctuation of several pounds in use of hog products per head of population may readily occur, this is an important fact in judging of influence of price on consumption. Oscar G. Mayer, president of the Institute of American Meat Packers, has remarked that lean meat is in style and apparently it is due for no early change. Under these circumstances, to increase the price of a naturally fat meat is to invite curtailment of use. A curtailment of 1 pound of lard and 4 pounds of hog products per person per year would roughly correspond to 3 million hogs slaughtered.

INTERNATIONAL COMPLICATIONS

If, under the operation of the equalization fee, the exportable surplus of hog products should not be increased, then foreign prices would not be affected. Under such circumstances, producers in foreign countries could find no grounds for objection if the export losses on an unaltered volume of exports from the United States were paid out of a stabilization fund, howsoever secured, or out of the United States Treasury. But if, under the operation of the plan, the American production of hogs should be so increased as to result in substantial augmentation of the volume of exports of hog products, leading to decline in prices in the importing countries of Europe, producers in importing countries might readily contrive to find political grounds for objecting. Export bonuses and

¹ See Appendix Table IV.

dumping (or even allegations of such) may serve to provoke reprisals, designed to protect domestic producers in importing countries from the effects of artificial stimulation of exports from other countries. The urban working classes of Europe would welcome lower prices of hog products, though these would tend in the course of time to be reflected in lower wages. If lower prices of hog products in foreign countries were reflected in lower wages and these eventuated in lower production costs, the consequently lowered prices of goods might tend to increase export of such goods to the United States. In short, if we ship foodstuffs abroad at a low price, this might indirectly tend to help Europeans to ship manufactures here at a lowered price. Higher domestic food prices mean higher costs of production of manufactures. This contrast may be more theoretical than practical; but it deserves mention in the discussion of any proposition to support exports by legislative action.

It is sometimes said that we dump hog products in foreign markets, and in trade jargon the expression is natural whenever hog products are shipped abroad to relieve domestic accumulations in cold storage. But when the term "dumping" is employed with precision in technical usage, interpretation is not so simple.

In connection with price comparisons at home and abroad, precision in the use of terms is essential. The first line of comparison is between manufacturers' prices for goods sold for export and those sold for domestic consumption. The second line of comparison is between wholesalers' (including jobbers') prices for goods sold for export and those sold for domestic consumption. The last line of comparison is between retail prices at home and abroad. The only valid comparison would seem to lie between manufacturers' prices on goods sold for export and for domestic consumption. But difficulties arise when goods are not sold for export but are shipped

abroad to agents, in effect, on open consignment, which implies comparison of wholesalers' and jobbers' prices rather than of manufacturers' prices.

Since dumping became an international *bête noire*, the definition of the term has been much discussed.¹ According to one seemingly logical definition, dumping occurs when goods are sold by manufacturers for export at lower prices than charged to buyers at home. Under this definition, occasional dumping would seem to be a well-nigh universal practice. Manufacturers, in order to enjoy the advantages of capacity operations, may occasionally feel the need to export a variable proportion of the outturn at lower than domestic prices. Manufacturers may occasionally dispose of goods abroad at lower than domestic prices in order to relieve pressure on the home market due to seasonal or other relative overproduction. It is not always possible closely to adjust production to demand, and the manufacturer may have to choose between price-cutting at home and price-cutting abroad, in order to dispose of casual accumulations. One must distinguish between incidental sale for export at lower price than at home and systematic sale for export at lower price than at home. If it were established practice systematically to sell for export cheaper than for home consumption and in substantial volume, this would deserve the term of dumping in a sense not applicable to incidental, sporadic, and casual selling for export at lower price than at home, such as might occur in the course of any business. Systematic dumping is unlikely in the case of an industry conducted along developed competitive lines.

According to another apparently logical definition, dumping occurs when goods are sold abroad for less than

¹ See Jacob Viner, *Memorandum on Dumping*, League of Nations, Economic and Financial Section (Geneva, 1926); also the chapter on "Dumping" in W. H. Beveridge and others, *Tariffs: The Case Examined* (London, Longmans, Green & Company, 1931).

the cost of production. Here again one must distinguish between incidental and systematic price-cutting below production cost. In any complex joint-product operation, certain products may be salable for no more than their separate expense without any share of the joint expense. This is often the case with clear flour in the milling industry, with chemical by-products of the manufacture of coke, with glycerin in the manufacture of soap. In this regard, the distinction between principal products and by-products is particularly significant. Indeed, it is possible that some by-products must be regularly sold at a loss, the burden to be carried by prime products sold at relatively high prices. Under such circumstances, it might be proper technically to speak of systematic dumping of goods at less than production cost, but practically the designation would signify little.

The packing-house industry, buying the live animals as raw materials, turns out a series of end-products, each one having an ascertainable separate expense and liable to a share of joint expense not so readily ascertainable. In the course of an intricate business of manufacturing these several end-products in the most economical manner, all things considered, and of selling them in the most profitable manner, all things considered, it may develop over a time that certain products are sold for export at prices lower than those obtained for the same products at home. And it may also happen over a time that certain products may be sold for export at less than the cost of production. It is doubtful, however, whether producers in foreign countries, or consumers at home, could make out a case of dumping in the sense in which the term is employed in international controversies over fair practices in trade.

Whether American hog products have been dumped abroad, in the sense of having been sold for export systematically at less than for domestic use, is a subject into

which we have not entered, but we doubt it. There is in this country no monopoly price of hog products behind which a policy of dumping could be shielded. Regarding lard as a unity, it may be surmised that at times the price of exported lard has been lower than the average wholesale price of federally inspected lard in the United States.

Whether, according to the second definition, lard has been sold for export for less than the cost of production is, again, a subject into which we have not entered. We have the impression that whenever the ratio between the price of lard and the price of live hogs rises above a certain ratio, let us say 75 : 100, lard is really sold below production cost, on a strictly accounting basis. But it would hardly serve a useful purpose to call this dumping in the international sense, so long as lard is sold on the domestic market also at less than production cost. Since lard is a by-product, the dumping of lard should be adjudged on that basis.

However, the political interpretation of the export relations of lard might not follow the technical interpretation. So long as the heavy export of American lard depresses the lard price in Germany, under conditions of unassisted hog raising in the United States, German landlords can find little reason for suggesting reprisals. But if, under any scheme of governmental assistance to hog raisers in this country, our exportable surplus of lard were enlarged, and this effected an added pressure on the German price, German landlords could make out a plausible political case for reprisal. A political case need not be proved, it needs merely to be plausible; and plausible only in the popular sense, not even plausible in the technical sense. That German landlords are in the mood for reprisal is readily ascertained by reading the agricultural press of that country. Reprisal would take the form of increase of tariff rates, ostensibly against all imports but in reality discriminatory against the United

States. Also, if our exports of lard were enlarged, in consequence of the operation of the equalization fee, we fancy other reprisals would be the foregone outcome.

This conclusion holds only for lard and salt pork, not for hams, shoulders, or bacon. Our exports of cured pork go largely to the United Kingdom. The Danes and Canadians might object to what they regard as the dumping of hams and bacon into the United Kingdom; but this would hardly lead to reprisals on their part. Recent developments, however, make possible the application of Empire preference for imports into the United Kingdom, favoring Canada and Australasia.

SUMMARY

Expertly managed, we believe the equalization fee would work initially under agreements with packing houses. We do not feel the plan would work initially without such agreements. Under a successful administration, conditions in the export market being equal, producers' prices of live hogs and consumers' prices of hog products would be raised. The price increases would not affect alike all classes, weights, and grades of hogs, and all cuts and products. The extent of price increase could not be predicted. This initial success might be expected to last one or two years.

The subsequent outcome would depend upon developments in demand and supply, conditions in the export market being equal. Higher live-hog prices would lead to higher hog-product prices. Higher prices for hog products would lead to restricted consumption. The extent to which consumers restricted consumption of hog products would depend mainly upon prosperity and upon the prices of products of cattle, sheep, and poultry. A relatively slight restriction in per capita consumption of hog products might have a marked effect upon the equation of demand and supply.

On the side of supply, higher hog prices would stimulate production; the extent of increase in production of hogs would depend somewhat upon the influence of governmental and co-operative authorities over breeding operations, and in the final analysis upon the extent to which individual farmers appreciated the crucial necessity of avoiding the familiar hog cycle. With an established policy of high price, it would be assumed by many husbandmen that the subsequent low price, which has otherwise followed, would not eventuate; farmers would infer that no subsequent price decline would occur or if decline occurred the loss otherwise to be anticipated would be shifted to the public. More than for any other crop, high price of hogs results in overproduction, because this is not a climatic effect, but a predetermined program of farming.

We take it that an increased supply of hogs, responsive to higher prices, and occurring despite equalization fee and admonitions to the contrary, would occur within two years after the inauguration of the plan. With per capita domestic consumption even slightly reduced, the increased supply of live hogs would result in stagnation of processed stocks in storage. If the increase in supply of live hogs were really large, packers could not continue to pile up stocks and the Hog Corporation would have to store them or ship them abroad. Exports would not relieve the congestion except through large-scale dumping. We do not believe price agreements could be maintained under such circumstances; buying prices would break and selling prices would break. It is possible that under the stimulus of such higher prices an abnormally heavy hog cycle would be inaugurated.

In short, the plan ought to achieve higher prices initially, because at first the supply of hogs would be moderate. The plan could not work beyond a couple of years unless the supply of hogs could be held moderate. We do

not believe this could be accomplished with the plan in operation, because the potential hog-raising and feed-raising capacity of the corn belt, and of the country, are too greatly in excess of the population of the country for the next decade. Demand could not be adjusted to oversupply and the sequential effect of oversupply on farm price of hogs would be unavoidable. The losses on exports would become heavy, and the elevation of the domestic price would fail.

With break in prices, the base-line of operation of the equalization fee would be lowered to an unprofitable level. Farmers in the corn belt, with extended operations, would be back where they started from, perhaps in a worse situation.

CHAPTER IX

THE EXPORT DEBENTURE

Statement of hypothesis—Operative considerations—The export debenture applied to corn—The export debenture applied to hogs—Summary

STATEMENT OF HYPOTHESIS

The export debenture is a legislative device designed to enable a crop regularly disposed of both on domestic and foreign markets to be merchandised on two price levels: a higher price level for the fraction domestically consumed, and a lower price level for the fraction sold abroad. The ultimate objective is increase in the weighted farm price of the product. As proposed for the United States, the plan represents a modification for a net exporting country of the import certificate long employed in net importing countries. It has also a certain analogy with commerce under the drawback.¹

The hypothesis is simply stated. In an agricultural country, like the United States, the price of an agricultural product tends to be influenced by the world price for which the exported surplus is sold. A segregation of such exports is sought, in order to rule out the domestic effect of the foreign price. An export debenture is a scrip, a certificate of exportation, based on a stated rate per unit of product. It is a bearer certificate, a negotiable instrument, acceptable at face value at the customs house in payment of import duties. The export debenture would

¹ Cf. J. D. Black, *Agricultural Reform in the United States*, pp. 255-70; J. S. Davis, *The Farm Export Debenture Plan* (Stanford University Press, 1929), and "The Export Debenture Plan for Wheat," *WHEAT STUDIES OF THE FOOD RESEARCH INSTITUTE*, July 1929, Vol. V, No. 8. The leading individual proponent of the farm export debenture plan has been Professor Charles L. Stewart of the University of Illinois; the leading agrarian supporter has been The National Grange of the Patrons of Husbandry. Toward the proposal the American Farm Bureau Federation has been indifferent or hostile.

be issued to exporters on proof of exportation of a debenturable farm product. The scrip may be used by the exporter to pay import duties on transactions conducted by him as an importer; it may be sold to an importer who similarly employs it; or it may be sold on the open market like any bill of exchange, eventually to find its way into the hands of an importer who will turn it in to the national Treasury in payment of import duties. The assured expectation of the subsequent possession of the export debenture places the exporter in position, when purchasing for export, of bidding up the price to the extent of the figure of the debenture. Domestic buyers of the product in question must bid against the exporter and each other, thus driving up the price. It is implied, on the theory of price determination as an expression of marginal utility, that the exporter buys the last instalment of the product on the market; wherefore, his bid fixes the price on the entire supply. Therefore, the price would be raised for the crop (qualified with certain assumptions in respect of elasticity of demand) to the extent of the figure of the export debenture.

The export debenture is a direct subsidy to the producer class, since money is withdrawn indirectly from the public Treasury to support the device. This, however, is only an incident; the essential purpose is to drive up the price on the crop domestically consumed. The revenue lost to the government through subtraction of revenue would need to be recouped by increase of import duties on other goods or by one or another form of direct or indirect taxation. The export debenture differs significantly from the equalization fee in that the first includes a subsidy, while the other does not; this distinction has played an important part in the political controversies between the farm groups supporting the equalization fee and those supporting the export de-

benture.¹ The export debenture obviously is applicable most naturally to a food crop rather than to a feed crop, to a cash crop rather than to a product crop, to a crop which is entirely sold except for carryover, and to a crop of which the exports occur in the raw state. Only in a more intricate manner does the device seem to lend itself to application to a feed crop, and only under exceptional circumstances to one product of a series of joint products.

OPERATIVE CONSIDERATIONS

The determination of the rate of debenture represents a particular difficulty. Four methods of establishing the rate have been suggested. The first is based on comparative advantage, comparative costs of production at home and abroad. With this determined and the tariff wall raised high enough to more than equalize production costs, the export debenture could be set as high as the tariff rate or at half of it or at any other determined fractional point. This would seem the simplest way of fixing the rate, if the difference in production costs could be determined. But most observers have lost faith in this procedure, and for three convincing reasons: social values of rural living are involved in production costs, the technical elucidation of production costs in different countries is methodologically impracticable, and a cost of production which is the average of a series of years becomes inapplicable in a particular year on account of high or low yield. Parenthetically remarked, there is no reason why foreign producers should open their records to American accountants, as was illustrated in the under-

¹Between the equalization fee and the export debenture there is one outstanding difference from the standpoint of the farmer. With the collection of the equalization fee, every grower has to submit to payment, representing a subtraction from his otherwise price, to be devoted to a scheme of marketing. Under the export debenture, the producer as such pays nothing. The equalization fee is a form of compulsory co-operative marketing; the export debenture is a subsidy, without direct application to co-operative marketing.

taking of the United States Tariff Commission to determine the cost of producing corn in Argentina.

The second method of fixing the debenture rate is to undertake to balance, or offset, the price increases on goods enjoying a protective tariff. This involves a measurement of the price effectiveness of the tariff on industrial goods. According to J. D. Black,¹ "A fairly safe measure of the amount of offset that the unprotected commodities as a whole should have is the amount which the prices of the protected commodities as a whole are raised." This, however, is an intricate appraisal and to date no trustworthy measurements exist, even of an approximate nature.

The third method of setting the debenture rate would be to place it, behind a tariff wall of appropriate height, high enough to have the elevated farm income regarded as satisfactorily remunerative to producers. The gross value of the crop and the purchasing power of the farm product would thus become the basis of the debenture rate. Resting rather on the profits of agriculture than on the profits of urban industry, the third basis of debenture rate-making would seem to be less complicated than the second.

By the fourth method, the rate might be based on volume of production in relation to price of the crop. In a sense this suggests applying to the debenture rate the variable of increasing returns. This method seems to have the approval of Black,² who says:

It is not easy to state what would be the proper basis for a system of export debentures in a country such as the United States. Probably the most workable plan would be to base them on their probable effect on volume of production in the principal exporting centers, as determined by analysis of effect of price on subsequent production

¹ *Agricultural Reform in the United States*, p. 270.

² *Op. cit.*, p. 264.

This method purports to include a working rule for the rate; also, it would seem to imply that the rate must be flexible and might indeed be suspendable. "A compelling argument for the debenture program is that it is a method that will benefit agriculture and at the same time cure itself, or, rather, we should say eliminate itself."¹ The importance of the initial setting of the rate, and its modification under circumstances of trend or exigency, deserve to be emphasized.

The proponents of the plan predicate the direct, automatic, and undiminished reflection of the debenture rate back to the farm price. It is agreed that the negotiable certificates would sell on the exchange market at a slight discount; but apart from that, the supporters insist that exporters would add the figure for debenture rate directly to their bids, that the bids of terminal merchants and processors would match the bids of exporters, and the increment would be reflected from the terminals back to the farms.² Terminal merchants and exporters, however, incline to skepticism, and this is shared by many economists. They hold the view that the degree of reflection back to the entire crop would vary with circumstances in foreign and domestic markets. If adjustment between importers' requirements and exporters' supplies in the world market is tight, with the complexion of a "sellers' market," the American exporters might be able to secure full added value for exports; but if that adjustment were easy, if there were a large visible supply and carryover in the world, with the complexion of a "buyers' market," American exporters would need to overcome "sales resistance" abroad and make their tenders attractive to importers. This they would do by lowering the price, in effect offering to importing countries a slice of the export

¹ *Agricultural Relief Hearings, Serial U, Part 4, pp. 135-36.*

² Qualification would need to be applied to take account of substitution and of contraction of use at a higher price level.

debenture. Corresponding circumstances would influence transactions on the domestic market. If the crop were large and merchants and exporters had free choice in respect to qualities, their bidding would be restrained and less effective, as in a "buyers' market"; if the supply were short and desirable qualities limited, processors would safeguard their requirements by active bidding, with the complexion of a "sellers' market." In short, producers would obtain the entire increment if buyers could be held up for it, but otherwise would need to be content with less than the whole of the increment. We incline to the view that producers would not routinely secure in farm prices the full increment implied in the export debenture; but only an extensive trial would show how much would be lost along the wayside of trade. Also, we hold the view that the workability of the plan, in regard to the reflection of the debenture back to farm price, and on other grounds as well, would be greatly enhanced by having exports centralized in an export board, instead of being scattered among commercial exporters. Especially if a board were set up to guide the domestic operations of the plan (determination of rate, effect on acreage, effect on carryover, etc.), this would seem to imply the conjoined operation of an export board.

One point of importance in the working of the plan, according to theory, is that the commodity would be exported in the form in which it is dealt in on the American market. Here, the highest degree of fluidity rules in the market, because many products are sold and bought on highly organized exchanges, where price changes are quickly and sensitively reflected and where exporters, domestic merchants, and processors enjoy insurance through hedging on future contracts. It is only under such circumstances of fluidity in trade that one ought to apply directly the classical doctrine of price as determined by marginal utility.

Compared with the equalization fee, the export debenture as a bare proposition possesses the advantages of simplicity, operation through the natural channels of commerce, and avoidance of governmental administration. The obvious bureaucracy of the equalization fee and the allotment plan (later to be described) would be dispensed with. The work of administration would be done largely by exporters, merchants, and processors in the routine conduct of their business. The printing of the debentures and a trifling increase of bookkeeping in the Treasury would be about all the governmental administration required. Merchants, exporters, and processors regard the export debenture as far less objectionable than the equalization fee. But applied to the United States, it seems probable that complications would emerge and administrative boards would become essential to the working of the plan.

The operation of the export debenture would tend to stimulate production. It includes a subsidy; producers as such do not pay the losses on exports. The device has usually been employed both to raise prices and to stimulate production. This was the objection to the export debenture consistently maintained by the proponents of the equalization fee. This objection has been recognized by the supporters of the export debenture, who have endeavored to safeguard against expansion of acreage by reduction of the debenture rate in the event of expansion. But the sliding scales proposed in Congress have been too far-fetched. It seems necessary to conclude that the export debenture inherently tends to stimulate production more than the equalization fee or the farm allotment plan to be later described.

Adverting to the German import-certificate plan, W. J. Spillman¹ has made the following comment:

¹ *Balancing the Farm Output*, p. 75.

Nevertheless, the plan has worked with a fair degree of efficiency simply for the reason that land is not available in Germany for making an enormously large increase in the acreage of the crops benefited by it.

The same plan applied to American conditions would fail because we do have vast areas of land that could be readily utilized in increasing the area of the crops benefited.

Finally, export debentures tend to provoke reprisals by foreign countries. The primary objective of the export debenture, the bidding up of the price of the fraction of the crop domestically consumed, makes little impression abroad. But a subsidy on exports stands out prominently. Whether the process is an export bounty in effect, whether it increases the volume of exports, whether it lowers the price in importing countries and thus injures producers in those countries, whether it represent a subvention of foreign trade, whether it is "government in business"—all of this is beside the mark in international politics. Our law provides for penalties against discriminations contained in export-favoring laws and regulations of foreign countries. Corresponding measures of defense, including anti-dumping regulations, exist in many countries. J. D. Black suggests that the widespread resentment against export bounties, more than against import duties, is "an irrational distinction, but nevertheless it exists."¹ The practical point is not whether the reaction is rational or irrational; the practical point is that the one lends itself to motivated political propoganda far more than does the other. A system of export debentures in the United States would certainly encounter foreign reprisals.² It is not to be questioned that the export debenture would expose the country using it to the counter-attack of foreign reprisal far more than the equalization fee.

¹ *Agricultural Reform in the United States*, p. 267.

² For a detailed discussion, see J. S. Davis, *The Farm Export Debenture Plan*, pp. 226-41.

We shall examine the export debenture in its applicability to corn and hogs with much less detail than was devoted to the equalization fee. This is not because it is to be regarded as less important; on the contrary, it is likely to be more prominently before the public, in the near future, than the equalization fee. But so much of what has been said on the factual circumstances and relations of corn and hogs, in the discussion of the equalization fee, bears with little variation on the export debenture. Thus, the effect of price on production and consumption would be the same in either case, other things equal. Also, the export debenture is simpler than the equalization fee and admits of a shorter analysis.

THE EXPORT DEBENTURE APPLIED TO CORN

Coming, now, to the application of the export debenture to corn, we find that the situation is complex but the interpretation fairly clear. Three consequences would follow the application of an effective debenture to corn: the terminal price of corn and the farm price of cash corn would be raised; the export of corn would be subsidized and possibly expanded; and the cost of meat production would be increased, this presumably to be covered later by export debentures applied to animal products.

Let us apply the theory, as corn growers seem to formulate it: for example, if the corn crop were 3 billion bushels, the amount leaving the county where grown 600 million bushels, the exports 50 million bushels, and the rate of export subsidy 15 cents a bushel (the tariff 25 cents), the export debentures issued on the export would correspond to 7.5 million dollars and the price of the 600 million bushels of merchandised corn would be raised by 15 cents over the otherwise price. The 50 million bushels of corn exported would be sold at the world price,

while the 550 million bushels of the merchandised cash crop used domestically would be sold at 15 cents a bushel above the otherwise price. The growers of corn would receive 90 million dollars more than would otherwise be the case and the Treasury would lose 7.5 million dollars. That looks like a small subsidy for a large gain in producers' price, or, rather, an extraordinary gain for a small subsidy.

But would buyers of corn for domestic uses meet bids of exporters in possession of the debenture of 15 cents a bushel? Inferentially the price would be met, in part if not entirely, *provided* that under the operations of the scheme the volume of corn shipped out of the county where grown were not expanded. But if, to continue the illustration used above, the initial driving up of the domestic corn price by 15 cents had the effect of increasing corn shipments (from the county where grown) from 600 to 700 million bushels, the equation between supply and demand would be shifted. The country might absorb 550 million bushels of cash corn at a price increase of 15 cents; but other things equal, the country could not be expected to absorb 650 million bushels of corn at a price increase of 15 cents. The price would fall, perhaps even below the natural price.

The export debenture plan would operate to increase the weighted price of cash corn only if the volume of corn leaving the county where grown remained relatively unchanged. If the volume of corn leaving the county where grown were to be substantially enlarged, this would create a different equation between supply and demand, with corresponding effect on price. Under these circumstances, it would seem that success in the operation of the export debenture plan would depend upon an effective measure of restraint of merchandising of cash corn. This could hardly be secured with the present methods of marketing corn. It would seem to imply the necessity of

a Corn Growers' Co-operative Association in the principal cash-corn regions, a Corn Corporation in effective control of the cash crop, and a Corn Exporting Corporation. Either the merchandising of cash corn would need to be restrained, to a varying extent from year to year, or a Corn Corporation would need to be in position to centralize the marketing of corn and, if necessary, withdraw it from the market and impound it. Some scheme of stabilization at one or the other end of the corn stream, or at both, would need to be secured, to insure the bidding up of the domestic price of cash corn, if the weighted price of cash corn of the crop were to be advanced by a sum approximating the figure of the export debenture.

Our overseas exports of corn are so small¹ that the cash price of corn could not be driven up significantly in the United States with an export debenture, no matter how high the tariff on corn.² If the corn in the cash market were all the merchandisable corn in the United States, as is the case with wheat, the debenture would apply according to hypothesis. But the corn merchandised as grain on the terminal markets is a small proportion of the crop; about a fifth of the crop leaves the county where it is grown, and the corn receipts in the terminal markets may be little over 10 per cent of the crop. Selling corn is usually regarded as an uneconomical disposition of the crop, except in a few regions. If the cash corn price were made more attractive, some corn would be diverted from feeding uses to cash sales. But if the attempt were made to raise the price of cash corn to a substantial extent, new sources of merchandisable corn would be readily uncovered; corn millers and feed-lot operators would not need to compete against corn exporters but would go back to the farms for new supplies. It is not an answer to rejoin

¹ Cf. Table 7 (p. 132).

² At 15 cents a bushel, the annual subsidy in the last five years would have averaged 3.2 million dollars.

that the debenture on hog products would serve to hold the corn on the farms for feeding; one can hardly invoke one contingency to deal with another. Some farmers would choose the higher corn price, others would await the higher hog price.

In view of the directly competitive relations of corn to oats, barley, sorghum grain, and millfeed, a shortage of these feedstuffs would favor raising the price of corn, but customary or abundant supplies would set up resistance. This brings up the same point observed in the case of the equalization fee. No one suggests an export debenture applied to oats, barley, sorghum grain, and millfeed; but according to the theory of the export debenture, an export debenture on corn could hardly be expected to raise corn prices unless some restraint were applied to the principal competing feedstuffs.

If an export debenture on corn were peradventure to raise the price of cash corn, this would be felt especially in the cash-corn regions. Corn acreage in these regions does not stand at the maximum and could be expanded. In the regions where corn is fed for the most part, a higher cash price of corn would tend to stimulate outbound shipments. This would make corn both more scarce and more expensive for feeding. To enlarge the corn supply and to secure the higher prices on hogs expected through the hog export debenture, acreage in corn would be expanded also outside of the cash-corn area. In short, a higher cash price of corn would tend to increase the acreage planted to corn more or less throughout the country, for the account of the corn trade and of the hog trade.

Under the Ketcham debenture bill, the rate of debenture on corn would be reduced as a "penalty" on overproduction, only if the crop were to exceed 120 per cent of the average of the five preceding years. Applying this, for example, to the corn crop of 1932, this would imply that no restraint would be imposed unless the crop were

to exceed 3.1 billion bushels (120 per cent of 2.6 billion bushels, the average of the crops of 1927-31), approaching the largest crop in history. If the debenture had been applied in 1924, no penalty would have been laid unless the crop had exceeded 3.6 billion bushels! The high basis of "penalty" sounds absurd as applied to corn, because a corn crop of 120 per cent of the average of the five preceding years can hardly be imagined. And if once harvested, what good would the subsequent attempt at check accomplish? If a more effective control on over-production cannot be devised under the export debenture plan than the scaling of rates suggested in the Ketcham bill, it follows that the export debenture plan commands no method for control of production of corn.

It is significant how few of the proponents of the export debenture attempt to picture the operation of a bounty on export of corn. J. D. Black¹ practically ignores corn. J. S. Davis² considers that any prospect which the export debenture holds for corn must come through the export debenture on hogs. In fact, from the standpoint of the inherent purport and limitations of the export debenture, the device is not fitted to apply to feedstuffs. None of the methods (except possibly the fourth)³ of measuring the rate can be applied to cash corn. Cash corn is a small fraction of a crop raised largely in diversified agriculture and involved in a complex joint-product operation with other feedstuffs on the one hand and meat animals and work animals on the other. Finally, an export debenture on corn would affect differently the men who buy corn, the men who feed their own corn, and the men who sell corn, and would adversely influence every animal husbandry in which corn is widely and generally used as a feedstuff. In short, an examination of

¹ *Agricultural Reform in the United States.*

² *The Farm Export Debenture Plan.*

³ See above, pp. 446-47.

the export debenture on corn may be dismissed as little more than a dialectic exercise.

THE EXPORT DEBENTURE APPLIED TO HOGS

When one comes to apply the export debenture to hogs, one encounters at once the distracting circumstance that the utilization of hogs is an intricate joint-product operation. Hogs are not exported as marketed or even as slaughtered, to any significant extent. Exports occur largely in the form of specialized end-products and not in proportion to the relation of these parts to the whole. Therefore, the export of hog products could not reflect the export debenture directly back to live hogs in the public stockyards as wheat export could reflect the export debenture back to raw wheat in the terminal markets.

Since the export debenture would apply not to hogs but to specified hog products, whereas the farm surplus exists in numbers of hogs, the setting up of the rate of debenture would involve peculiar and exceptional difficulties. No one of the four methods of measuring the rate (see pages 445-47) seems applicable to hog products. The price level of live hogs, the proportional relation of the particular export unit to the whole animal, and the customary relation of prices between the different parts of the carcass would all need to be taken into consideration. The export debenture is administratively applicable to carcasses, fresh pork, and to all hog products; but practically it can be considered applicable only to lard and cured hog products. The direct objective would be to raise the domestic price of these products behind a high tariff wall by the extent of the debenture; the rate of debenture would indicate the price increase sought for the part in question. The ultimate objective would be to elevate the farm prices of live hogs.

The export debenture could be applied to hog products in one of several ways. The export debenture might

be applied as a flat rate on all hog products. This would be simple but commercially illogical, since it could hardly be sought to raise the domestic price of the several hog products by the same unit of currency. One cent a pound would be a considerable factor in the case of lard, but much less so in the case of hams.

The export debenture might be applied to hog products on the sliding scale, apportioned to the values and possibly also to the volumes of production. It might be sought to maintain the customary price relations between the different products; or, if these were to fluctuate in a particular season, it might be sought so to modify the rate of debenture as to correct the fluctuations and thus operate in the interest of stabilization.

Recognizing that the fat and not the lean constitutes the chief marketing difficulty, the export debenture might be applied solely to lard and the fat cuts grouped under salt pork. This would tend to have the effect of maintaining a ratio between the domestic prices of lard and salt pork and the live-hog prices. Sustained, it would enable the packers to pay more for hogs and lighten some of the load now being carried by hams and bacon. In short, such an application of the export debenture would tend to increase somewhat the price of live hogs, stabilize the price, and promote balance between the prices of the several hog products.

Difficulties would also be encountered in the initial setting up of the figures of the debenture and in later readjustments. In recent years we have been exporting close to 50 per cent of the reported production of federally inspected lard and over 30 per cent of the estimated total production of lard. The exports of hams, bacon, shoulders, and pickled pork have been around 7 per cent of the reported carcass outturn of federally inspected slaughter (excluding lard) and nearly 5 per cent of the estimated carcass outturn of estimated total slaughter

(excluding lard).¹ The different hog products are sold at different levels of price on different margins of profit. It is probably a fair statement to say that the national business in lard and pickled pork is done at not far from cost; the profits are mostly made on bacon, hams, shoulders, and loins. Anything that would elevate the price level of the cheaper products might enhance prospects more than further elevation of the price level of expensive parts. In other words, perhaps the best prospect for effect through an export debenture would be to get lard and pickled pork out of the usual position of depressing the price of live hogs.

One could thus view the setting of the debentures in one of two ways. The several debentures, according to the one scheme, would represent pro rata applications, giving expression both to relations of weight and relations of price level. This would mean that the relatively heavy parts, like hams, would carry a higher debenture than relatively light parts, like picnics. Also, the relatively expensive parts, like bacon, would carry a higher debenture than relatively cheap parts, like dry salt bellies. In short, the debentures would be weighted for volume and for price. With the use of packing-house data, figures for debenture could be set up for the different hog products passing into export, in the expectation that the sums represented in these debentures could then be assembled, so to speak, and harmoniously reflected back to the live-hog price.

From the other point of view, export debentures would not be applied to hams, shoulders, bacon, and loins, but only to lard and salt pork. Other things being equal, if the exported volumes of lard and salt pork could be substantially increased, the domestic prices for lard and salt

¹ Bureau of Agricultural Economics, U.S. Department of Agriculture, *Statistics of Meat Production, Consumption, and Foreign Trade in the United States, 1900-1930.*

pork would be somewhat increased, and this without notable increase in the prices of cured cuts. From Table 31 (p. 412) it will be observed that 1923 and 1924 furnished illustrations indicating the possibility of raising the prices of lard and salt pork without correspondingly increasing the prices of other hog products. If the ratios of wholesale prices of lard and salt pork to live hogs could be held low through the operations of an export debenture, this would at once improve the position of packing houses and tend to raise producers' prices for live hogs.

The export debenture rates on hogs and products prescribed in the Ketcham bill¹ were as follows:

Live hogs.....	One-fourth cent per pound
Fresh pork	Three-eighths cent per pound
Cured hog products...	One cent per pound
Lard	One-half cent per pound

This scale of rates is illogical to producer, packer, and consumer. The coarse fat backs of packer hogs would carry the same rate as the choice hams of butcher hogs. The low-grade bellies of packer sows would carry the same rate as the choice bellies of bacon pigs. The fat backs would carry double the rate of lard. Not only are these rates inequitable between themselves; the entire scale is far too low to afford scope for price increase. If the scale had been set from 5 cents on hams and bacon to 1 cent on lard and salt pork, it would have been better from every point of view of the proponents of the measure. In a description of the export debenture plan issued by the National Grange, it is suggested that debentures be fixed at one-half the existing tariff rates. Since the existing tariff rates have no logical or commodity basis, this suggestion has no real meaning and represents no reasoning based on commercial relations.

The marketing operation of the export debenture on

¹ H.R. 10568, introduced February 6, 1928, 70th Congress, 1st Session.

hog products would be much less simple than with grain. The exporters, for the most part themselves the packers, would receive the debentures. The domestic market prices of the several products would not be so directly affected by the bidding-up of prices by domestic traders, as in the case of the export debenture applied to grain. The sum received in export debentures by packing houses would serve to cover losses on the export of lard and salt pork or possibly to make the export of these products profitable; it would facilitate the export of hams and bacon and serve to make this trade more profitable. With exports facilitated, the forces of domestic competition in supplies would be somewhat abated, with improvement in prices. The net result would be not a pro rata driving up of the domestic prices of hog products corresponding to the rates of the export debentures, but instead a generalized augmentation of returns to packing houses. These, in response to competition between packing houses, would be reflected to producers in the form of higher live-hog prices. We take it that the reflection to the farm price would be not merely less direct but also less quantitative than in the case of the export debenture applied to a crop exported as grown.

Importers representing foreign countries do not, as with wheat, appear on American markets themselves, or in the person of American exporters, and bid for hog products in open trading competition with American merchants seeking these provisions for sale to domestic customers. The packers are also the exporters, and thus, in effect, the exported hog products are mostly sent abroad on consignment. Under these circumstances, the influence of foreign price on domestic price, though persisting, is less direct than for wheat. The larger the volume of hog products disposed of abroad, the smaller the volume of hog products remaining to be sold on the domestic market in competition with beef, lamb, poultry, eggs, and

dairy products. The smaller the amount of hog products disposed of abroad, the greater the effort necessary to sell the large volume remaining at home, forcing lower prices to stimulate consumption. The export debenture on hog products would therefore operate essentially by lowering the volume left to be sold on the domestic market.

Under the Ketcham bill, the rate of debenture on hogs and hog products would not be reduced, as penalty on overproduction, unless the slaughter were to exceed 120 per cent of the average of the five preceding years. Applying this, for example, to the slaughter of hogs in 1931, this would imply that no restraint would be sought unless the slaughter exceeded 85.7 million hogs, which is 120 per cent of the average (71.4) of the five years 1926-30. Now a slaughter of 85 million hogs in 1931 would represent the greatest glut in hog products in the history of the country. The suggested rates of penalty sound absurd as applied to hogs. For example, the debenture would be reduced one-half (from 1 to $\frac{1}{2}$ cent on hams and from $\frac{1}{2}$ to $\frac{1}{4}$ cent on lard) if 100 million hogs were slaughtered. If a more effective control on overproduction cannot be devised under the export debenture plan than the scaling of rates suggested in the Ketcham bill, it follows that the export debenture plan includes no practicable control of production.

The influence of export debentures on hog products on the production of hogs and the consumption of hog products would presumably be relatively the same as that of the equalization fee. Both plans combine the policy of higher price with an actual increase in prices. It would therefore seem fair to expect the same reaction in each direction from each plan, in accordance with the effect on prices actually attained. But inasmuch as we surmise the export debenture would hold more prospect than the equalization fee in raising the price of hogs, it would also have the greater effect on production. An export subsidy,

which the government pays, would have a stronger influence than an equalization fee, which the farmer pays. The proponents of the equalization fee and of the export debenture have been at outs on the relative advantages (or disadvantages) of the two plans in respect to the effect on production—each group contending that the plan of the other group would most stimulate production and could be least controlled. It is beyond the purview of the writer to understand how under either plan production would be limitable, if the prices of live hogs were to be substantially increased or if farmers had confidence in the policy of price increase. The prices of hogs, not the rates of the equalization fee and the export debenture, would be the figures visible to the farmer, and represent the factors making for expansion. The price policy, more than the corn-hog ratio or the conversion ratio, would determine the breeding program.

If one may reason on inferences, the export debenture rates in the Ketcham bill applied to hog products could be expected to affect existing conditions so slightly that no demonstrable effect on live-hog prices would occur. One-half a cent per pound is not enough to change lard from a poor relative to a rich uncle. To have the same debenture rate on high-priced hams and bacon and on cheap sow belly is absurd. But an effective export subsidy of 5 cents a pound on lard, barreled pork, and dried salt pork would be expected to have a significant initial effect on prices of live hogs.

If debentures suitably and effectively applied to hog products were to be substantially reflected back to live-hog prices, the consequences on consumption to be anticipated would correspond to the degree of elevation of retail prices. The outcome would depend upon the state of prosperity and upon the prices of the other meats than pork, just as in the case of an increase in price due to any other cause.

Viewing the export debenture on hog products solely as a procedure to be contrasted with the equalization fee, the farm allotment plan (later to be discussed), and price stabilization, a relatively good case may be made out for this device. More is to be said for it and less to be said against it than in the case of the other proposals. Black regards the export debenture as the only plan "workable"¹ for pork products. Without entering into an appraisal of just how workable (initially and subsequently) the plan would prove to be, or how extensive might be the increased returns to hog raisers, we hold the same view. But it seems to us that if the plan ever comes to trial, the initial operations should be limited to lard and fat parts. If successfully applied to the disposition of these products, the outcome would effect the restoration of those relations that obtained between the several joint products during the hog years 1923-25, when lard and fat parts carried relatively good prices and did not constitute a brake on packing-house operations. The effect on live-hog prices thus attained would modify the dominating price influence of the supply of hogs. With a short supply of hogs and a higher price level, the contributory influence of a favorable relative position of lard and fat parts might well be substantial; with a large supply of hogs and a low price level, a favorable relative position of lard and fat parts would tend to mitigate the price-depressing influence of the large supply. In short, as an adjunct to a policy of adjustment of supply of live hogs to demand for hog products, the export debenture (considered merely in its technical aspects) might well prove feasible; as a sole and independent method of influencing live-hog prices, little could be expected of it.

W. J. Spillman,² one of the oldest of American farm

¹ *Agricultural Reform in the United States*, p. 317.

² *Balancing the Farm Output*, pp. 69 and 70.

economists, and in possession of widespread field experience, has made the following comment on the export bounty. Having pointed out that we have still a relatively large amount of land, both new and once used, that might be placed in production, he gave expression to the following statements:

Under these conditions a production bounty of any kind *on all of a given product* sufficient to make it distinctly profitable would inevitably tend to increase the acreage of the crop, and it is easily believable that such increase might ultimately lower the price to such an extent as to render the bounty ineffective, or even make the price, with the bounty added, less than the present price. . . .

A number of the proposals made have provided for some form of export bounty for the surplus of a farm crop sent to foreign markets. There is no question that such a bounty would tend to raise the price of the product in the United States to the level of the world price plus the bounty, less, of course, the cost of exportation.

But it has just been pointed out that anything that would raise the price of the *entire product* of a crop might easily cause such increase in the acreage of the crop as to nullify whatever benefits in the way of price increase might be temporarily brought about by the increase in price. The same objections hold against an export bounty as against a direct production bounty.

It is our judgment that export debentures on hog products would provoke reprisals by European countries. Certainly, if packers in possession of debentures dumped lard in large amounts in Germany, reprisals would be forthcoming. There is no question that the export debenture bears an aspect that provokes reprisals in a sense not true of the equalization fee, because the export debenture looks, acts, and reads like an export bounty.

SUMMARY

The export debenture is a device designed to enable a higher price to be obtained on the fraction of a crop consumed domestically while permitting the exportable sur-

plus to be disposed of abroad at the world price. The instrument of the operation is a bonus on exports, through which it is believed exporters would be able to drive up the competitive price on the home market to an extent practically equal to the figure of the export debenture. The export debentures would be legal tender in payment of import duties; thus, the income of the Treasury would be reduced corresponding to the figure of the debenture and the amount of the export. The proposal implies a subsidy by the national Treasury. The rate of the debenture and the method of measurement would vary from crop to crop. The plan fits best a durable agricultural crop exported in the condition in which it is harvested. It is too much to claim that the domestic price could be advanced to the extent of the figure in the debenture. A successful application of the export debenture would stimulate production and might provoke reprisal by foreign countries.

We do not believe the export debenture could be used to influence significantly the cash price of corn. Our export of corn is too small in most years and more and more inclines to be a Western Hemisphere trade. If the bidding of corn exporters should influence the price of corn upward, this would be promptly followed by increased marketing. Since the proportion of the corn crop leaving the county where grown is ordinarily about 20 per cent of the crop, any influence which tended also to increase the movement of corn from farm to terminal markets would check the increase in the price of corn. The argument for the export debenture fits the case of wheat, but does not fit the case of corn.

In the case of hog products, the export debenture would necessarily be applied not to hogs, but to hams, shoulders, bacon, pickled pork, and lard. It would be difficult to measure and adjust the rates of debenture, and clearly it would be inequitable to fix the same export

bonus on high-priced ham and low-priced lard. Possibly the best application would be to lard and pickled pork. It is difficult to envisage the market mechanism whereby an increase in the price of lard obtained through an export subsidy on cured products, reacting on packing houses, would be proportionately or equitably reflected back to live hog prices. The rates proposed are too low to assure significant results. In short, we regard the export debenture, from the standpoint of its proponents, as inapplicable to hogs on account of the intricate joint-product nature of packing-house procedures. In our view, export debentures on lard and pickled pork would offer the best prospect of success. If, under a comprehensive system of export bonuses applied to the several hog products, the price of live hogs should be increased, or give the hope or semblance of increase, this would lead to increased production, and possibly to decreased consumption—the former more likely than the latter.

CHAPTER X

THE FARM ALLOTMENT PLAN

The farm allotment plan was devised and proposed, so far as we are aware, by the late W. J. Spillman under the term "limited debenture plan."¹ At the time, we regarded the proposal more or less as a dialectic exercise on the part of the genial farm economist. The scheme provided for a highly organized horizontal integration of the several branches of agriculture, and seemed designed hypothetically to indicate how it might be possible to raise the price on the fraction of a crop grown for export and without increasing production. Spillman regarded the proposition as dialectic² rather than concrete, because it introduced so large a measure of legalized and compulsory supervision into the detailed operations of the individual farm. J. D. Black, however, regarded the scheme as technically applicable to the circumstances of present-day American agriculture and elaborated it for presentation in Congressional hearings and in his subsequent book.³ The weight of the names of

¹ *Balancing the Farm Output*, pp. 84-104.

² The use of the adjective "dialectic" seems justified by the following two paragraphs from *Balancing the Farm Output* (p. 83):

"I can not here go into the wisdom of such a plan, further than I have already done in setting forth the arguments that have been made for a procedure of this kind. I can discuss only its economic and agricultural phases.

"In presenting a plan which, if adopted, would result as above stated, I do not desire therefore to be considered as advocating it. My aim is merely to set forth the details of the plan and to give my opinion as to how it would operate."

The introduction to the proposal (p. 84) is well worth quoting:

"Any plan for making the tariff effective on farm products in the United States without causing increase in production or without affecting world prices must provide some kind of effective limitation on the production of the article the price of which is to be increased, and must make it possible, and practicable, to sell an exportable surplus at the world price while the remainder of the product sells in this country at a higher price."

³ *Agricultural Reform in the United States*, pp. 271-301. For comparison with equalization fee and export debenture see also pp. 309-18.

Spillman and Black makes it incumbent on students of the agricultural problem to give the allotment plan an objective consideration.

The allotment plan is essentially based on considerations of utilization of the land. It applies to the farm rather than to the farmer. Each farm raising a crop passing into domestic consumption and into export trade has, in effect, two divisions—a domestic division and an export division. Assuming that each grower has the same yield and has the same quality in the crop, a *pro rata* utilization of the land devoted to that crop could be readily established. As it is, one ought to employ an average acreage, the mean, let us say, of five years, with an average yield per bushel, again the mean of five years, the quality being regarded as unity. This would be the base-line, which would need to be adjusted for increase of population and increase in yield.

Now, in the farm allotment plan it is desired to separate the domestic business from the foreign business of each farm and to conduct the two on different price levels. It is sought, behind the tariff wall, to run the domestic business on a high price level, making the domestic consumer pay prices commensurate with the domestic price level for non-agricultural products. The foreign business would need to be done on the foreign price level.

On the basis of the statistical base-line adopted, each farm would have a limited right to and share in the domestic market but an unlimited right to the foreign market. The domestic price would be controlled; for example, as it is usually predicated, it would be set at the foreign price plus the tariff. The foreign price would be uncontrolled; the farmer would take his chances in that field. The allotment plan lends itself to cash-crop agriculture and especially to one-crop farming, particularly to wheat and cotton. Only with greatly increasing

complications could it be applied to diversified agriculture with joint products.

Let wheat be cited in illustration, using arbitrary figures. We employ for example a total acreage of 64 million, with a yield of 14 bushels per acre, representing a crop of 896 million bushels. Taking 672 million bushels as the all-inclusive domestic requirement, this leaves a surplus of 224 million bushels. That is, three-fourths of the acreage is operated for domestic, one-fourth for foreign business. Three-fourths of the acreage, namely 48 million acres, represents the gross domestic allotment. To set up the farm allotment plan, each wheat grower would have allotted to him for planting for the domestic market and at the domestic price three-fourths of his established, verified, and accepted acreage; one-fourth of his accustomed acreage would be available to him for raising wheat for export. In practice, there would need to be moving adjustments for yields, varieties, and qualities of wheat. The wheat grower would retain a certain right on the allotment for the domestic trade, presumably so long as his total acreage equaled his allotment figure. At his pleasure, he could increase or decrease land planted for the export trade; he could "cut in" or "cut out" of international commerce as he saw fit.

Accepting the established status quo as the base-line, the farm allotment plan would thus fix the participation of each grower in the home market and specify the proportion of the home market belonging to him. He would be free to do as he chose in the export field. His domestic trade would be specified and regulated; his foreign trade would be free. In his domestic trade, both volume and price would be controlled; in the foreign trade neither volume nor price would be controlled.

After the farm allotments were adopted for the several wheats in the different regions, the trends and adjustments provided for, and the going program accepted,

would come the practical problem of administration. The crop raised on land assigned to the domestic allotment, and this alone, must be paid for on the high domestic price level; the rest of the crop must be paid for, or made to sell, on the lower world price level. There could be no evasion or subterfuge, no bootlegging of the crop from the export class into the domestic class. Obviously, the administration would cover minute details and would entail employment of police powers.

Spillman had suggested administration by a commission, with the county as the unit. Dealers would be licensed and placed under bond. Each year would be reported the crop raised and the amount sold on the farm whose allotment was specified. The licensed dealers would purchase debentures from the county commission, at the stated rate. Whenever a farmer sold to a licensed dealer he would receive the market price and debentures corresponding to the transaction. At the end of the season, the producer would receive from the commission the extra sum due him on his domestic allotment, corresponding to the debentures in his possession. The debenture was thus the instrument by means of which the county commission secured the higher price and turned it over to the producer. The licensed dealer would pass on the higher price to the consumer class. On products passing to export, the exporter would receive the return of the sum paid out for debentures when the crop was purchased. On the crop sold to the licensed dealer, in excess of the domestic allotment assigned to his farm, the producer would receive no extra payment. The size of the extra payment on the domestic allotment would be determined by the tariff rate. Thus worked out by Spillman, the administration of the farm allotment would occur under a special form of commission government, exercising extensive police powers over both producers and dealers.

The domestic allotment plan of J. D. Black is an elaboration of the limited debenture plan of W. J. Spillman. The total allotment of acreage for any crop would be made by an Allotment Commission of the Departments of Agriculture and Commerce, based on data of the Division of Crops and Livestock Estimates and the Census Bureau. Each state would have its allotment commission, and provision is made for revision of allotments. The individual allotments would be set up in the form of allotment rights, based on the unit of land involved. The allotment rights belong to the farm, not to the farmer. The allotments rights are transferable and are supposed to be sold like bills of exchange. As they are transferable and salable, a farmer could sell his allotment rights at any time; thus, the allotment rights might serve as credit and advance payment if desired. The rate of the allotment right in respect of any crop would depend upon the tariff, presumably the same as the import duty. Provision is made for prevention of fraud in the disposition of allotment rights. In the case of wheat, processors, i.e., millers, instead of grain dealers, would be licensed to deal in allotment rights and wheat comprehended therein. Since there are fewer millers and they are more responsible than grain dealers, this represents an improvement in the administration. The miller might buy the wheat and the corresponding allotment rights together; or he might buy the allotment rights from a bank and purchase the corresponding wheat from any dealer. Presumably, wheat would be priced on the export basis, without the allotment right, and would thus be dealt in as at present. "The device in the transferable-rights plan for forcing the domestic price to the level of the world price plus the tariff is to require all processors of wheat to show the allotment rights above described, for all domestic wheat milled and sold as wheat product in the domestic mar-

ket.”¹ “The allotment rights are worth an amount per bushel to the grower which equals the amount of the tariff duty, except for the discounts and transportation and quality differentials”² The miller would pass on the added price to the consumer. On flour passing to export, the added price would be rebated; wheat passing to export would receive a corresponding treatment. Effective supervision would demand an elaborate system of reports, licensing, bonding, and penalties. Black would center the administration in the Bureau of Internal Revenue.

Both Spillman and Black were convinced that the allotment plan would tend to stimulate acreage much less than the equalization fee and the export debenture. The annual experience of the grower, who would receive the lower price per unit for the crop grown outside of the domestic allotment and the higher price per unit for the crop grown on the domestic allotment, would tend to restrain expansion of acreage for the crop to be sold at the world price. This inference seems reasonable and sound if segregation were effective.

We have inserted a description of the allotment plan in order to include all the projects prominently put forward. But the plan has little meaning for the surplus of corn and hogs. Both Spillman³ and Black⁴ recognized that the allotment plan is not suitable for corn and hogs. A separation of the corn acreage corresponding to corn exports from the cash-corn acreage or the total corn acreage, as basis for allotment rights, would be fictitious. To have meaning, the allotment rights for corn would need to be divided between corn sold for cash and corn used as feedstuffs, and no workable base-line could be set up.

¹ J. D. Black, *Agricultural Reform in the United States*, p. 277.

² *Ibid.*, p. 281.

³ *Balancing the Farm Output*, pp. 101-03.

⁴ *Op. cit.*, pp. 292-93.

Allotment rights for hogs could not be based on the breeding stock, as on acreage of wheat or of cotton. It would be impracticable to have either the buyers or the processors of hogs deal in allotment rights. The plan would imply the licensing of all slaughterers (wholesale, customs, retail, and packing-house) and of all wholesalers and dealers in pork and hog products.

The farm allotment plan may be identical in substance with the protective tariff, but it is totally different in form. To put it into operation on a compulsory basis would be equivalent to the agricultural policies of Soviet Russia and Fascist Italy. If our country ever undertakes for agricultural products the separation of the foreign from the domestic price level, this will be done with the export debenture or the equalization fee, not with the farm allotment plan.

CHAPTER XI

PRICE STABILIZATION

Introduction—Stabilization of corn prices: Variability of corn prices; Seasonal change in the corn price—Stabilization of prices of live hogs and hog products: Variability of hog prices; Co-operative marketing of hogs; Stabilization operations—Inflation of the price level—Summary

INTRODUCTION

In the rural press and in Congressional hearings on farm relief one finds much discussion on "stabilization"¹ of prices. Stabilization of prices was one of the objectives of the McNary-Haugen bills, and the objective is contained in every farm relief plan. The objective of price stabilization is inherent in the concept of co-operative marketing. But the term has come to include so much that it resembles an omnibus, and it is necessary to define and delineate it.²

It is urged by farmers that year in and year out the price of cash corn (and other grains) is artificially low directly after the harvest and artificially high prior to the harvest of the next crop. By "artificially low" is meant a position not determined by supply and demand. A

¹ Stabilization of price, as applied to corn and hogs or to any agricultural commodity, has no reference to monetary influences, and is concerned solely with the relations of the supply, the distribution, and the consumption of the commodities in question. It is assumed that outside of variations in the supply, distribution, and consumption of the commodities in question, and their substitutes, monetary influences remain constant. Stabilization as an instrument in farm relief applies to the price of the individual farm product within the price level, not through change in the price level. Those who seek so avidly the "stabilization" of prices of grain seem not to know that Alfred Marshall contended that grains have been more stable than gold, or, if they know this, hold the statement of little importance. (Cf. Alfred Marshall, *Money, Credit and Commerce*, London, Macmillan, 1923, p. 54; also J. M. Keynes, *A Treatise on Money*, I, 109.)

² For a discriminating discussion of the topic see J. D. Black, *Agricultural Reform in the United States*, pp. 80-176 and 349-66.

restraining hand is lacking in country marketing; the flow from country towns to terminal cities is not adjusted to demand. It is urged that the fluctuations in grain prices from week to week, from month to month, and within a season are manipulated and do injury to producers. The net effect of trading in futures farmers hold to be derogatory to the weighted terminal price of the year; selling futures as a hedge against receipts is believed to depress prices more than buying futures to remove the hedge raises them. Also, bear raids on the grain exchange are supposed to be more in vogue than bull campaigns on the grain market. Finally, it is contended that the price levels of large and small crops of corn and other grains do not correspond to the sizes of the crops; with large crops the price is unduly depressed, while with small crops the price is not duly elevated. It is contended that the visible supply and the rate of marketing of corn have more influence on cash price than the amount of the crop that leaves the county where grown. If more cash corn could be held over from fall until summer and perhaps sometimes from year to year and the price smoothed out, growers feel they would profit. It is widely believed by farmers that high moisture-content of corn is too heavily penalized directly after the harvest and low moisture-content not sufficiently evaluated during the following summer. It seems to be true that corn, among the other grains, often sells below its relative price based on nutritional values. What is sought is to give the terminal grain market the complexion of a "sellers' market," whatever the size of the crop, replacing what is now felt to be in most years a "buyers' market." Finally, if the price could be "stabilized," the corn-hog ratio would be less open to misconstruction by hog breeders.

Under "stabilization" is included, however, more than mere price stabilization—it includes price elevation. In part, the price elevation would be incidental; but, in

part, it would be the result of opportunistic merchandising, centralized control of supplies, proceeding from the semi-monopolistic attitude of a unified organization of producers dealing with a multitude of unrelated buyers. Stabilization of crop income is not what is sought; what is sought is higher price, larger crop income, and this has come to be implied under "stabilization."¹

Price stabilization, thus defined, is an objective of cooperative associations of producers. It requires a trading corporation with special powers and adequate financial resources—in short, a "stabilization corporation." Both the substance of price stabilization and the form of the stabilization corporation are contained in the Agricultural Marketing Act. Under its broad permissive powers, the Federal Farm Board has the authority to undertake so-called stabilization of prices of agricultural products. No "stabilization" of the prices of corn and hogs has been undertaken by the Farm Board.²

It is appropriate at the outset to make a comment on consumers' prices, since these are involved in the price stabilization argument as it is frequently conducted. It is a familiar fact that the spread between producers' prices and consumers' prices of foodstuffs is relatively wide. We are told that the price of an order of toast in a public eating-house has no relation to the wholesale price of bread, and that the retail price of bread has no relation to the farm price of wheat. We are told that the price of the grilled chop or steak has no relation to the stock-yard price, or the farm price, of sheep, hogs, and cattle. We are told that the retail price of the tray of berries has no relation to the price of berries on the produce exchange. The topic lends itself to headlines, and the

¹ In political discussions especially, stabilization of price is a euphemistic term for elevation of price.

² The Mealie Control Act, enacted in South Africa not long ago, is a sort of price stabilization of the domestic corn price by segregation of the export surplus stipulated as 35 per cent of the crop.

implications are uncontrollable. Broadly considered, it is clear that the costs of distribution are very high; whether too high for the services of distribution is not so readily determined. In particular, advertising and selling costs place a heavy burden on the consumer's price.

In any event, the existence of a wide spread between producers' prices and consumers' prices has lent support to the plan of price stabilization through a stabilization corporation. It is sought to narrow the spread. By many it is assumed that with contraction of the spread a corresponding profit would accrue automatically to producers. Those who agree that any saving through contraction of this spread would be divided between consumers and producers feel that with the existence of a stabilization corporation producers would secure a larger share than consumers, who are unorganized. As a practical proposition, it is urged that farm prices might be steadily advanced over a scale without the movement being reflected in consumers' prices. A point would be reached when consumers' prices would be raised by distributors under the pressure of advancing producers' prices. The gain achieved up to this point would be pure gain for producers, without loss by consumers, and would represent a substantial reform in the mechanism (and emolument) of distribution. Whenever producers felt that their costs would justify still further advancement of prices, when that point was reached the driving up of consumers' prices would become a practical question. In short, this general argument rests on the notion that if producers were effectively organized they would be in position first "to squeeze the water" out of current distributive practices and then, if they chose, compel consumers to pay higher prices; and this could be done without infringement of the scant anti-monopolistic provisions of the Capper-Volstead Act, which provided that consumers' prices must not be "unduly" enhanced, since

it could hardly be urged that prices were "unduly" enhanced until farm profits had been "unduly" inflated.

Whether this would work out in practice is doubtful. The British Food Council has attempted to control the spread of prices of certain foodstuffs, somewhat as a stabilization corporation might be supposed to do. The results can hardly be regarded as satisfactory in any case. The situation in Great Britain is simpler than that in the United States because so large a proportion of the foodstuffs under consideration is imported. We take it that American producers, before undertaking to revise the practices and restrict the profits of distributors, need to determine to what extent current expenses in distribution of foodstuffs are due to the extraordinary standards of service now imposed on distributors by consumers. In this situation we observe a good illustration of the trend of the modern scale of living in emphasizing services rather than goods.

If price stabilization were to be contemplated for corn and hogs, how would the undertaking be approached, what are the limits of the operation, and what are the prospects of success? These questions are considered in the balance of this chapter, but the approach in each case must be circuitous rather than direct because so few precedents are available.

STABILIZATION OF CORN PRICES

VARIABILITY OF CORN PRICES

The variability of corn prices is rather pronounced. According to computations of F. C. Mills,¹ the year-to-year variability of corn prices stands relatively high. On the basis of the United States Department of Agriculture's averages of the December 1 farm prices, the measures

¹ *The Behavior of Prices* (New York, 1927).

of year-to-year variability, as computed by Mills,¹ of farm prices of the five grains for the period 1890-1913 were as follows:

Rye	10.5
Wheat	12.5
Barley	13.7
Oats	17.4
Corn	19.5

On the basis of wholesale prices,² the measures of year-to-year variability of the five grains for the same period were as follows:

Wheat	12.8
Rye	14.6
Corn	14.8
Barley	17.8
Oats	19.8

The measures were differently computed for farm prices and terminal prices. Without making allowance for this difference, it would seem to follow that the year-to-year variability of the farm price of corn is more pronounced than the year-to-year variability of the terminal price of corn.

Within the year, corn prices display notable fluctuations which vary from season to season. Fluctuations occur from day to day, from week to week, and from month to month. The short-term fluctuations are influenced by the limited cash market for corn, the effect of country weather on the marketing of corn, the ease of altering the volume of corn shipped from the county where grown, and the varying prices of oats and mill-feed. Probably the monthly variations possess the most significance. In Appendix Tables XV and XVI are to be found the deviations of the monthly weighted average

¹ *Op. cit.*, p. 53.

² *Op. cit.*, p. 497.

prices of corn from the average price of the previous month and from the average price of the year.¹

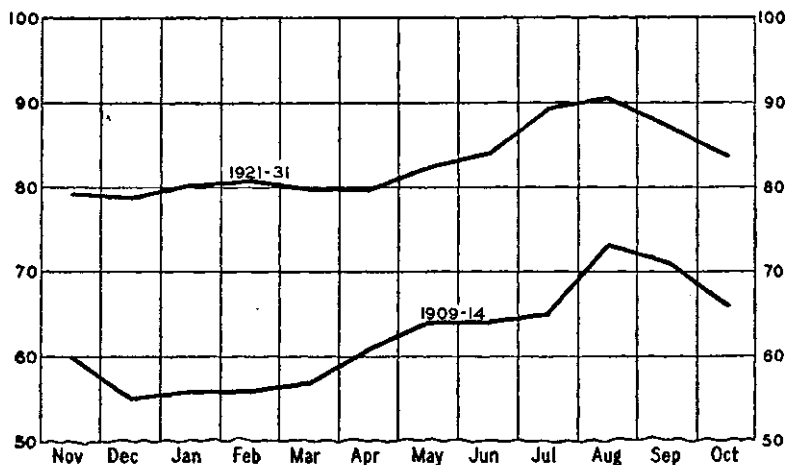
THE SEASONAL CHANGE IN THE CORN PRICE

Finally, the price of corn displays a marked seasonal variation. It is with the seasonal variation in the price of corn and with the variation from one corn crop year to the next that any program of stabilization of price is especially concerned. This seasonal change seems to have been growing during the last forty years, due to heavier winter marketing.

Chart 19 gives a graphic reproduction of the seasonal

CHART 19.—SEASONAL PRICE OF NO. 3 YELLOW CORN AT CHICAGO, AVERAGES FOR NOVEMBER 1909—OCTOBER 1914 AND NOVEMBER 1921—OCTOBER 1931*

(Cents per bushel)



* Data from *Agriculture Yearbook, 1931*, p. 626, supplemented by data furnished by the Bureau of Agricultural Economics of the U.S. Department of Agriculture.

¹ Appendix Table XXIII contains the monthly farm prices of corn for the five years before the war and since 1921.

price of No. 3 corn in Chicago. The pre-war prices are the averages of the five corn crop years 1909-14; the post-war prices are the averages of the ten crop years 1921-31. The character of the movement and the amplitude of the range are well illustrated in this chart. Comparing the curves, it is to be observed that in the post-war period the post-harvest drop and the pre-harvest rise are not significantly different from what they were before the World War, though the range is wider.

The characteristic seasonal increase in corn price in the months after harvest has a technical explanation. Sound mature corn is relatively high in moisture when husked; the moisture-content of average field-run corn after husking is likely to run close to or even over 25 per cent. (This is likely to be higher with mechanical husking.) Wide variations appear even in sound mature corn. For example, the average moisture test for Iowa corn on October 11, 1929, was 28.1 per cent; on the same date in 1928 it was 23.4 per cent. When shelled directly after husking, corn does not dry out well unless carefully stored and tended; corn dries best on the cob in a properly constructed crib. When corn lies in the crib until early summer, the moisture falls to 14 per cent or lower. Corn properly dried on the cob will gain in grade during the winter, as expression of loss of water. The federal grade No. 1 corn may carry a maximum moisture of 14 per cent; No. 2 corn 15.5 per cent; No. 3 corn 17.5 per cent; and No. 4 corn 19.5 per cent. A freshly shelled corn that graded No. 4 in December would grade No. 2 (occasionally No. 1) in April, after drying on the cob. Against the gain in grade over the winter must be set the loss in weight, which may be several pounds per bushel, as much as 20 per cent of the initial weight. Applied to the shelled corn (excluding shrinkage of the cob), the loss of weight may run from 8 to 12 per cent. Under customary circumstances, with each month the price of the grade rises. In

short, when the farmer carries his corn over into the following summer, the price of each grade tends to rise and his corn gains in grade classification, but he has less corn to sell.

Beyond this circumstance of loss of moisture, however, the price of corn tends to rise during the winter; the price of corn in July tends to be higher than in December, following adjustment for change in weight, loss of moisture, and improvement in grading. This additional increase in price is related to the cost of carrying corn. The cost of carrying corn per bushel per month is relatively constant from year to year, but the change in price from December to July varies greatly from season to season, even when adjusted for the physical changes. It is these variations in the seasonal movement of the corn price that have long interested corn growers. Would it be possible to raise the weighted farm price for the year by having the curve more even through the twelve months? Would it be possible by controlled marketing, without increasing the carryover, to avoid most of the low price during the winter and still retain most of the high price during the summer? Moreover, is it possible to carry corn over at a profit in the event of controlled marketing?

When corn is stored on the cob in a self-ventilating crib, heating or other decomposition is avoided; but the crib must be vermin-proof if losses are to be avoided. The cost of carrying corn includes the shrinkage, interest and insurance, and loss by vermin. It is commonly assumed that the shrinkage and improvement in grade offset each other. If this were the case, then the cost of carrying corn would correspond to interest and insurance and loss by vermin, or an amortization charge when the corn is stored in a vermin-proof crib. It is doubtful if the cost is ever less than a cent a bushel a month (shelled basis), and it may be considerably more.

We are unable in any tabulation of corn prices to find the evidence to show that it is routinely possible to carry corn through the summer and obtain more than coverage of the inclusive carrying charges.¹ In the article on corn in the 1921 *Yearbook* (pp. 212-13) of the Department of Agriculture, the following warning is given: "It must not be concluded from the advance in prices taking place after harvest time that it will always pay to hold corn for the higher prices that are likely to be paid later in the year." In the nature of the grain, there would be less prospect of doing this (in any large volume) than in the case of wheat. Occasionally it happens with corn and oats that limited amounts can be carried over the winter at notable profit; but it happens only in occasional years, only in some cities and not over the whole country, and only in a few elevators and not in all of them. If a Corn Corporation undertook to do it routinely, such price stabilization as might be thus accomplished could not be done at a profit on the fraction carried over.

In two articles—one by G. S. Shepherd, the other by G. S. Shepherd and W. J. Hart²—are to be found opinions on the disposition of the corn crop. In Iowa, corn can usually be carried over with profit from a large crop; but carrying corn from a short crop will usually result in loss unless exceptionally offset by improvement in grade. Followed as routine practice, the costs of storage usually offset the seasonal rise in prices. Any profit must be sought in improvement in grade; and since some improvement in grade on storage through the winter may be expected if the corn has been properly selected and

¹ Cf. for wheat, "Wheat under the Agricultural Marketing Act," *WHEAT STUDIES OF THE FOOD RESEARCH INSTITUTE*, August 1929, V, 381-91.

² G. S. Shepherd, *When Shall We Sell Our Corn?* (Iowa State College Agricultural Experiment Station Circular 113), January 1929; and G. S. Shepherd and W. J. Hart, *Profits and Costs of Storing Corn on Iowa Farms* (Iowa State College Agricultural Experiment Station, Current Economic Series, Report No. 1), December 1925.

stored, the practice of storage is recommended to Iowa farmers, following average or large crops. The corn-hog ratio affects the prospect. It is, however, conceded that the prospect would be reduced if more farmers practiced storage until summer than is generally the case. Also, long-term net returns would need to be computed.¹

It is obvious that these writers were concerned with corn *in Iowa* and were advising corn growers *in Iowa*. The statements could not have been expanded to apply to the *corn belt*. That a small group could hold corn over with profit is admitted; the question is whether corn can be generally and routinely held over with net profit. If profits from storage of corn were easy, grain traders would long since have exploited the practice. As it is, experience has forced traders to hedge corn in order to avoid losses. Carrying corn is obviously one of the many things that it is possible to do with profit only if few growers undertake it.

Price stabilization from crop year to crop year is a very different proposition which might involve holding substantial amounts of corn.² For reasons of climate rather than of acreage, the corn crop is subject to heavy fluctuations, the average fluctuation during the past twenty years being close to 350 million bushels. In a year of short crop, corn may be so scarce in some regions as to embarrass the operations of animal husbandry; in a year of bumper crop, the storage and disposition of grain may represent a problem, accentuated by a heavy decline in price. If several hundred million bushels of corn could be carried over from years of bumper crops into years of shortage, three sets of effects would be achieved: (1)

¹ See, also, a more recent article by G. S. Shepherd, "Do You Plan to Sell or Hold Your Corn?" *Wallaces' Farmer*, January 25, 1930, pp. 8 and 26-27, which contains the following statement: "Hold your corn until summer when the United States crop is big. Sell it in the early winter if it is small."

² For an excellent discussion of "Gains from Holding Over till Later Years," see J. D. Black, *Agricultural Reform in the United States*, pp. 129-51.

the high prices of the year of shortage would be lowered and the low prices of the year of glut would be raised; (2) feeding operations would be rendered more efficient; and (3) the fluctuations in the corn-hog ratio would be restrained.

Whether over a term of years the weighted price would be increased by more than enough to cover carrying charges is a question to which no numerical answer can be given. During the crop year 1923-24, with a crop of 3,054 million bushels of corn, the average price of No. 3 corn in Chicago was 88 cents; during 1924-25, with a short crop of only 2,309 million bushels of corn, the average price of the same corn in Chicago was 106 cents; during the crop year 1925-26, with another large crop of 2,916 million bushels, the price was 75 cents. If half a billion bushels had been carried from 1923-24 into 1924-25, would the weighted price during 1923-25 have been sufficiently increased to make the average for the two years high enough to have more than covered the carrying charges?

Carrying corn from a bumper crop into a short crop would be profitable; carrying corn from a small crop into a large crop would be unprofitable. In the long run, other things equal, these would tend to balance each other, but carrying charges would operate only on one side of the ledger. If a Corn Corporation could guess the crop and the market, the appropriate policy would be to carry corn from a long crop into a short crop, but to carry none from a short crop into a long crop. The carrying policy would need to be opportunistic and not routine. Under the present and probably unavoidable limitations of the art of forecasting, to attempt to stabilize the corn price over a decade would represent speculation in cash corn. And perhaps the largest factor in the speculation would lie in the reactions of farmers toward selling or feeding corn.

**STABILIZATION OF PRICES OF LIVE HOGS AND
HOG PRODUCTS**

It is not possible to enter into details on this topic, except in relation to general considerations and by way of emphasizing differences in commodities. Discussions of "stabilization corporations" have revolved largely around wheat and cotton. The so-called "holding movement" is naturally applicable to grain and cotton and to a few other crops. But when, since the war, "stabilization" was set up as a general remedy, numerous attempts have been made to apply to animals and animal products (especially butter) the marketing precepts drawn from the grain field. Here, as elsewhere, stabilization includes elevation of price—a more even price movement on a higher price level.

VARIABILITY OF HOG PRICES

On account of high perishability, and for other reasons as well, one would expect live-hog prices to be highly variable. Perishability in itself need not be determinative; live-cattle prices, for example, seem less variable than wheat prices. It will suffice to present a summary. According to the tabulation of Mills,¹ live-hog prices (more variable than those of cattle but less than those of sheep) have not exhibited a high month-to-month variability; they have shown considerably less, for example, than has corn. The year-to-year variability² of hog prices has, however, been more pronounced, and live-hog prices have exceeded in variability those of both cattle and sheep, but not of corn.³

The wholesale prices of cured hog products ought

¹ F. C. Mills, *Behavior of Prices*, p. 489.

² *Ibid.*, p. 497.

³ Interested readers will find in Appendix Tables XVII–XX variations of slaughter and of Chicago prices of hogs. Appendix Table XXIV contains the monthly farm prices of hogs for five years before the war and since 1921.

naturally to exhibit less variability than the prices of live hogs, even though they were marked up and down with hog prices. Contrasting the measures of monthly variability of cured hog products with those of other foodstuffs,¹ one observes that the variabilities are not particularly high, but that the prices of salt pork vary more than those of hams and lard. However, when we come to the year-to-year variability,² the high variability observed for live hogs, which finds a natural expression in cured hog products, raises the measures of variability to a considerably higher level than obtains in the measures of month-to-month variability.

Husbandmen in the corn belt quite generally make three complaints on hog prices: first, that short-term and seasonal fluctuations are too wide and find their explanation not in considerations of supply and demand but in marketing practices; second, that price spreads between classes, weights, and grades of live hogs are too wide; and, third, that the spread between live-hog prices and the wholesale and retail prices of carcasses and of the several products is too wide. Farmers seek "stabilization" of the seasonal price of live hogs, of the differentials between classes, grades, and weights, and of the spread between live hogs and hog products. In an earlier chapter,³ reference was made to the different kinds of fluctuations that attend live-hog prices, and from the considerations there adduced the inference was drawn that producers tend to exaggerate the effect of short-term and seasonal fluctuations on the weighted farm price.

Broadly regarded, the marketing of live hogs is a field where "orderly marketing" would prove advantageous if it could be accomplished. For hogs of each class and grade and weight there is a week when they should be

¹ F. C. Mills, *op. cit.*, p. 490.

² *Ibid.*, p. 498.

³ See above, pp. 186 ff.

sold in 'order to secure the best equivalent return for nutrients, in calories and in costs. Sometimes animals are rushed half-finished to market; in other cases they are carried too long and fed to excessive weights. Farmers sometimes feel forced to liquidate their droves. From the standpoint of the terminal market, live hogs should be sent to the stockyards in summer and in winter in accordance with seasonal domestic and foreign demand and the position of storage stocks.

But a program of shipments of live animals from the standpoint of seasonal demand for products need not be expected to coincide (except accidentally) with a program of shipments from the standpoint of feeding efficiency. A policy of stabilization would have to include co-ordination between the two. The skill with which the flow of hogs to market might be guided by a Hog Corporation would depend upon the accuracy of information on current demand and storage stocks, but still more on the correctness of appraisal of the feeding position of the corn belt and the number of hogs expected to come to market throughout the season. A formula for forecasting the price of hogs, such as has been developed by Ezekiel, ought to be very helpful. Something could be accomplished in stabilizing the price of live hogs throughout a season by comprehensive surveys of intentions to market, in conjunction with a judicious program of movement prepared in co-operation with the packing houses. The Hog Corporation could aid in stabilization of farm prices, also, by carrying stocks of hog products, either directly or through agreements with packers making it responsible for stocks in packers' hands. Possibly, at times, the control of stocks might be as important as the control of the movement of live hogs to market. Effective stabilization of hog prices implies stabilization of hog breeding, feeding, marketing, and stocks.

Hog raisers aver that current practices of marketing

reduce the premiums paid for exceptional animals of types in particular demand by packers and exaggerate the discount for animals of types not in especial demand. The contention that price spreads between classes, weights, and grades are too wide is for the most part a particularization of the charge that all price fluctuations are too wide. Hog raisers are importuned by packing houses to raise bacon-type hogs; yet the premium accorded them seems sometimes small. And not infrequently, relatively large receipts of light hogs drive them to a discount. Butcher hogs are superior to packer hogs, and wide price differences sometimes appear between the two classes; sometimes, however, heavy receipts of butcher hogs drive their prices down to those of packer hogs. To some extent, the fluctuations between classes, grades, and weights react upon the joint-operation problem of the packers, and are related to variations in demand for different kinds of hams, shoulders, and bacon. The ease with which heavy and rough hogs go to discount is related directly to the declining demand for fat pork, and the continuous but fluctuating difficulty of the packing houses in the disposition of lard. To whatever extent price spreads between classes, grades, and weights are inequitable, the solution would seem to lie along lines of production rather than through marketing.

Lastly, husbandmen have the feeling that the price spreads between different pork products are too wide, that these are not justified by joint-product considerations of packers, nor expressive of gradations of consumer demand. It is difficult to appraise these views on account of lack of comprehensive and adequate statistical data. These price spreads have increased since the war. Table 31¹ contains the prices of hogs and hog products in Chicago for the two years before the war and during the

¹ See above, p. 412.

past ten¹ years. If one accepts these prices as representative of country-wide conditions, it follows that the wholesale prices of smoked hams, bacon sides, fresh loins, lard, short ribs, and mess pork have all risen relative to the price of live animals. But beyond this, it seems clear that the prices of smoked hams, bacon sides, and fresh loins have risen substantially more than the prices of lard, short ribs, and mess pork. The ratios in Table 31 speak clearly on the point. On the basis of the data in the table, the average ratio of smoked hams, bacon sides, and fresh loins during 1913 and 1914 was 179, on the basis of 100 as the base-line price of live hogs; the corresponding average gross index of lard, short ribs, and mess pork was 129. Even before the war, therefore, a heavy price difference ruled between the two groups of products. Since the war the combined average gross index of smoked hams, bacon sides, and loins has risen to 222 on the basis of live-hog prices of 100; the combined average gross index of lard, short ribs, and mess pork has been 144. (Even this low index for lard, ribs, and mess pork has been somewhat raised by the unusually high lard ratios of 1923 and 1924.) Prices for smoked hams, bacon sides, and loins, judged by relative index numbers, have risen since the war by 24 per cent, while the prices of lard, ribs, and mess pork have risen by only 12 per cent. Either hams, bacon sides, and loins have gone out of line upward or lard, ribs, and mess pork have gone out of line downward.¹

Without insisting that the foregoing quotations and ratios represent approximation of actual occurrences, these price developments are readily explained. They are the result of increasing consumers' preferences for lean over fat pork, preferences which find their inevitable reflection in packing-house prices. Therefore, it does not

¹ For strict comparability these should be reduced to pre-war dollars.

sound reasonable to ascribe to practices in marketing of live hogs, or to merchandising practices of the packing houses, the relatively high current premiums on hams, bacon sides, and loins, and the current discounts on lard, ribs, and mess pork. Similar differences exist in Europe.

In so far as the spread between farm prices of live hogs and retail prices of hog products, and variations between different products, are concerned, the subject is part of the general problem of distribution. Complaints similar to those voiced by hog raisers are uttered by producers of most other raw materials.

CO-OPERATIVE MARKETING OF HOGS

There is little doubt that when farmers sell their hogs to local drovers, who consign them to commission merchants in terminal markets where they are resold to packing houses, the spread between farm price and packer's price is relatively wide, since not only does the drover make a profit but unnecessary carrying charges and losses fall on the farmer. Hogs are highly perishable, susceptible to injury, and suffer substantial shrinkage in weight unless properly handled. Co-operative marketing of hogs is replacing the country drover in the corn-and-hog belt, and with better care in transit and acceleration in transportation (disregarding the freight rate) the spread between growers' price and packers' price has been materially narrowed.¹

The difficulty in discussions on the spread between farm price and abattoir price of hogs lies in the scarcity and untrustworthiness of regional price data. It is clear that proper handling of animals in transit is of great importance; but with co-operative marketing and proper handling, it is not clear what economies are to be effected by changes in the current distributive methods. Certainly

¹ Cf. editorial on marketing of hogs in *Wallaces' Farmer*, January 25, 1930, p. 6.

the problem of the inadequacy of hog prices does not lie in the spread between producer and slaughterer.

STABILIZATION OPERATIONS

In regard to hogs, when considering the control of the movement of supplies to market, there are two kinds of supplies: the supply of live hogs to slaughterers and the supply of fresh and cured cuts and products to the distributive trade. Control in the two cases would require different points and methods of approach. The separation between the raw supplies and the finished supplies is not a separation on paper—it exists as a commercial fact. The small slaughterers and the wholesale and customs slaughterers sell their carcasses to distributors or processors. In the large packing houses the operations and accounting are clearly separated; the slaughtering division sells its products to the fresh-meat and curing divisions, with which are associated the rendering and other by-product activities. In the one case, live hogs are the raw material, the supply; in the other case, fresh cuts and cured hams, shoulders, bacon, and fat cuts and lard are the raw material, the supply. If an agency contemplates stabilization of the price of hogs, that would be one thing; but stabilization of the prices of hog products is an entirely different thing.

Producers' co-operative associations in the corn belt have long regarded moderation of short-term price fluctuations as an outstanding marketing objective. The day-to-day and week-to-week fluctuations, even more than the month-to-month variations, ought to be susceptible of some restraint through control of shipments to stockyards in terminals. Even if little is accomplished in raising the weighted average farm price of hogs,¹ the producers' associations have a special interest in preventing individual

¹ See above, pp. 193 ff.

shipments from running into low prices. An effective policy includes sending out more hogs on some days as well as fewer hogs on other days. The control lies at country points, since storage charges make it impracticable to hold the animals back from sale in terminals. Moderation of the seasonal movement in hog prices is a production rather than a marketing problem, and includes both restraint of breeding and some readjustment of breeding for summer and winter slaughter. So long as the accustomed incentives control breeding, measures of restraint applied to marketing are bound to be disappointing.

On March 1, 1930, trading in futures contracts for live hogs was inaugurated on the Chicago Board of Trade. Other exchanges have followed suit. If the innovation is successful and a large volume of trading is developed, it may well be that the subject of stabilization of hog prices has entered upon a new stage. Trading in live-hog futures will necessitate the setting up of precise standards of grading, superior to any yet employed. This is certain to be in the interest of producers. Beyond this, the outstanding advantage will be the spreading of the risk of marketing a perishable commodity seasonally produced. Up to the present, the purchase and slaughter of live hogs could not be hedged. It has been possible to hedge lard, ribs, and bellies, but the price insurance has been insignificant. The raw materials should be hedged by the packers, not the finished product—just as in wheat it is the grain and not the flour which is hedged by the miller. The hedging of lard will continue, and with it, sooner or later, the hedging of all the vegetable oils which compete with lard and with each other. The final result will be, for husbandmen, improved registration of price, reduction of speculative risks, enhanced foreseeability of price movement, and diminution in short-term and seasonal fluctuations in the prices of live animals. In the long run, the advantages

and savings will be divided between the producers, the processors, and the consumers. There is no purpose in further discussion of the subject here; but it is necessary to insist that the problem of price stabilization will be different under a system of trading in futures from what it has been in the absence of any price insurance.

During its first two years the operations of the Federal Farm Board in respect to hogs have been confined to aiding in the organization of co-operative associations and in the establishment of a National Feeder and Finance Corporation. It is the function of the livestock co-operatives to collect hogs for shipment at country points, to guide the flow of hogs to market, and to sell them in the terminal markets and to packing houses directly, as well. What is aimed at is the prevention of the gluts due to overshipment which in the past have produced such sharp variations in terminal hog prices. The extent to which credits have been extended through the Feeder and Finance Corporation is not a matter of public record. Stabilization operations as such have not been undertaken. It is not yet possible to determine whether the control of marketing by the National Livestock Marketing Association has resulted in any increase in the weighted farm price of hogs in the corn belt.

It may be urged that under the revolving fund of a stabilization corporation stocks of hog products could be withdrawn from the carryover, and the visible supply held in cold storage reduced. But to take hog products out of the hands of packers and put them into possession of a centralized marketing agency does not remove them from the supply that must later be equated with demand in price on the public markets. At some time or other, the segregated hog products must be fed back on to the domestic market or disposed of abroad. Stabilization of price through the use of the holding movement seems technically inapplicable to hogs. Hogs cannot be held,

though the rate of marketing may be somewhat restrained. Hog products can be held in cold storage, at readily ascertainable costs. When corn is carried over from one season into the next, it is taken over from the growers. But if hog products were to be carried over from one season into the next, these would have to be purchased from packers. Unless carefully safeguarded by elaborate agreements, the Hog Corporation might easily be placed in the position of "holding the bag" for the packing-house industry. In the case of the equalization fee, we discussed the necessity of agreements with packing houses; for price stabilization, the circumstances are entirely different. In a simple holding movement, the Hog Corporation would need to bear its own risks, since the packers would have no motive for entering into covering agreements before or after they had sold their surpluses to the Hog Corporation.

In view of the occurrence of cycles in hog prices (assuming that these are to persist), considering that the cycles are relatively short-term, this circumstance might seem to afford a special basis for stabilization of prices by a Hog-Products Corporation. That is, at the time of the trough of hog prices the corporation would build up stocks of hog products and sell them at the peak of hog prices. One difficulty, assuming recurrence of cycles, is that the periodicity is quite irregular, as is illustrated in Chart 9.¹ Something similar might be accomplished through futures trading, though the long pull would involve a great deal of transferring of the contracts from one trading month to another. What really negates the idea is that it represents the cure of an evil that should be checked at the source. Instead of trying to make money for producers out of the hog price cycles, the undertaking should be to prevent the cycles.

¹ See p. 191.

It may be urged that a centralized marketing agency could develop foreign markets for hog products in a manner not practicable for packing houses. The larger the volume exported, the smaller the volume remaining on the domestic market to be equated with domestic demand. The large packing houses are international in operation, have far-extended and supposedly efficient export divisions, but of course do not aim to export at a loss. Whether a centralized marketing agency could export more than do the packing houses, except at a loss, is doubtful. In one respect the operation of a centralized marketing agency would seem to offer an advantage over the packing houses, in so far as the interests of the hog raiser are concerned: when the packing houses push export of American hog products abroad, to some extent they do so in competition with animal products manufactured by themselves in plants located in other surplus-producing countries. The Corporation would have no divided interest.

It might prove practicable for the stabilization corporation to deal only with the lower-priced fat products of the hog, which are essentially the price-depressing factors—namely, lard and salt pork. With these disposed of, to some extent, outside of the customary channels of trade, the ratio of the price of lard to that of live hogs would improve on the domestic market and the packers thereby be placed in position to pay a higher price for animals to be slaughtered. But to search out new foreign markets (largely of low purchasing power) for lard and salt pork could presumably be done only at a loss.

If live-hog prices were stabilized, this would tend to stimulate hog production, unless the stabilization were associated with the program of control of breeding and marketing. If prices of hog products were merely stabilized but not elevated, this would presumably not depress

consumption but might indeed stimulate it. If the stabilization had the effect of relatively raising the prices of lard and fat cuts, this would tend to depress consumption of hog fat in competition with substitutes. A substantial elevation of prices all along the line, prices of other animal products and fats being equal, would reduce consumption of hog products.

Any program to stabilize the prices of hog products which involved the dumping of lard and fat products in foreign countries would be likely to provoke reprisals. Germany is our largest market for lard, and agrarian resentment against American lard already runs high in that country. The participation by any quasi-governmental corporation in a program of unloading lard on Germany might have instead the opposite result of reducing the German market by provoking reprisal.

INFLATION OF THE PRICE LEVEL

We refer here briefly, without acceptance or criticism, to an agitation now under way in the United States, namely, the proposal for a formal elevation of the price level through inflation of credit or other effective governmental action. The price decline since the peak in 1919-20 represents a primary deflation, a temporary stabilization, and a second deflation of the price level. We use the term "deflation of the price level" in accordance with common usage, which is possibly not technically accurate. Producers of raw materials the world over have come to the view, more or less clearly expressed, that for years to come costs cannot be reduced to correspond with the decline in prices, nor can the prices of finished goods be so reduced. Therefore, a general method is sought for raising the price level, since it has become obvious that so-called stabilization practices, or other forms of artificial control of marketing, will not raise the prices of commodities individually or collectively. The abandonment

of the gold standard in England has the effect of an inflation of credit, with elevation of the price level. If the various countries of the world heavily engaged in export trade in raw materials all proceed more or less to raise their price levels through inflation, this will leave the United States in what might be termed a deflation isolation. It is of course an external form of alleviation. The problem is too large for discussion here, and we are not competent to discuss it properly. The agitation for cheaper money comes and goes, but this time it is accompanied by clear-cut proposals for stabilization of the price level. Many farmers in the corn belt believe in a formal inflation of credit and currency to restore the price level at least to that of 1926, when the present basis of index numbers was adopted. Internationally, the world may be approaching stabilization of prices and employment, rather than stabilization of exchanges, which was the chief objective of the gold standard before the war. It would be a mistake to dismiss the agitation for stable money and for a formal and planned program of inflation to secure elevation of the present low price level as a revival of earlier fiat-money agitations. The movement goes much deeper than this.

The practical people who make up the business world are coming to the conclusion that something must be done to moderate the trade cycle. The lure of the recent boom has been lost in the present depression. Gradually it is becoming felt that, while wealth is to some extent created in booms and lost in depressions, for the most part the swings of the trade cycle effect a redistribution of wealth. A desire for moderation, often expressed as stabilization without implications of economic theory, permeates all classes. Without subscribing to the view that the trade cycle has a monetary origin, a suffering public is coming to the view that there ought to be a monetary control, at least for the extremes. When farmers in the corn belt

declare in favor of a currency inflation sufficient to restore the price level of 1926, what they really mean is an appeal for some system whereby the state of affairs in 1926 might have been perpetuated without the boom of 1928-29 and the depression of 1930-32. Such an impulse toward stabilization ought to be given a sympathetic and constructive development. Otherwise, under a democratic form of government, extremes of fiat money or of social control of enterprise may be the undesired outcome.

The profound depression of prices of primary raw materials has awakened in many countries the agitation for stabilization of prices. This is not confined to extreme political circles; objective examination of the question is taking place in the most orthodox circles. Indeed, it may be fairly said that a modern description of the monetary system includes some reference to stabilization of the price level. Of this a pertinent illustration may be offered in the following quotation from the report of the Macmillan Committee on Finance and Industry:

The task of the monetary system, as we see it, is, therefore, to balance, so far as it can, by changes in the quantity and terms of credit, the effect on the price level of certain fluctuating factors, which, whether we prefer to call them or their underlying causes monetary or non-monetary, are largely outside the *direct* control of the monetary system.¹

Interested readers are referred to recent articles by Carl Snyder and James W. Angell and to an earlier hostile criticism by J. S. Lawrence.² A discriminating discussion has recently been contributed by Friedrich A. Hayek.³

¹ Committee on Finance and Industry, *Report*, Cmd. 3897 (London, 1931), p. 94.

² Carl Snyder, "Overproduction and Business Cycles," *Proceedings of the Academy of Political Science*, June 1931, XIV, 5-31; James W. Angell, "General Price Stabilization," *loc. cit.*, 97-104; and Joseph S. Lawrence, *Stabilization of Prices* (New York, Macmillan, 1928).

³ *Prices and Production* (London, George Routledge & Sons, 1931).

SUMMARY

We find little in available price data to substantiate the view that stabilization of prices (strictly construed) by a Corn Corporation would notably raise the level of corn prices and improve the weighted average price. If the Corn Corporation had the cash crop under control, it might secure somewhat higher prices; but this would be the result of control of the market, not stabilization of the price through so-called orderly marketing. The words "stabilization" and "orderly marketing" mean little applied to a commodity like corn, to a crop of which less than one-fifth leaves the county where grown.

In the nature of things, both short and long crops could be best handled under centralized marketing in the interest of growers. Something might be accomplished in certain regions where distressed corn is regularly dumped on the market as rapidly as harvested.

It may be freely granted that a competently managed Corn Corporation, with adequate capital, could probably guess the turn in the corn market more than half the time. Such a Corporation, over a term of years, might speculate in cash corn with an average profit, and also, on occasions, buy and sell corn futures with profit; but whether the profit would be net as well as gross would depend on many things. There is no purpose in haggling over terms: the holding of corn represents speculation, or "investment in corn," as the practice is nowadays politely termed. Dealings in futures as well as cash corn would need to be included. Under all circumstances it seems necessary to insist that success would depend upon some measure of control over production. Moreover, the handling of the cash corn crop would need to be co-ordinated with the handling of the corn crop going into hogs and cattle. The most that could be hoped for would be some diminution in the fluctuations in corn prices from month to month and from year to year; nothing approaching a

uniform price could be maintained either within a season or from one crop year to another. But if stabilization of the corn crop, in itself yielding no net profit, by control of the corn-hog ratio could prevent hog cycles, this would be a substantial accomplishment. In short, if technically successful, the benefit of stabilization of corn price would be indirect rather than direct. We take it, therefore, that the real objective of stabilization of the price of corn would be stabilization of the production of hogs.

Stabilization implies a co-operative association. A corn growers' co-operative association, if desirable, would not need to extend outside of the corn belt. The control of the cash corn of the country by the corn belt is such as to make the setting-up of an effective co-operative association seem simpler and easier than establishing effective wheat growers' co-operative associations in the four divergent wheat regions of the United States. It would be the tactics in operation of stabilization to restrain the autumnal marketing of corn and keep the visible supply in terminals as low as possible. At the same time, exports to the Western Hemisphere should be facilitated; if possible, these exports should be routed from country points to destination without appearing in the visible supply. If, in a season of large crop, a heavy carry-over is decided upon, this should be accumulated at advantageous country points, both for reasons of low cost of storage and to keep the corn as much as possible out of the visible supply at terminals.

Whether net gains would accrue through centralized export of corn overseas, except in an occasional year, is to be doubted. We can hope to export corn to Europe in volume only when domestic feedstuffs are relatively short on that continent, when the price of barley is up or the price of Argentine and Balkan corn high. Under these circumstances we can hope to supplement the European feed supply. A co-operative association of corn

growers could of course sell below the Argentine price in Europe; but when one compares the prices of American and Argentine corn in Europe since the war, it becomes obvious that to replace Argentine corn would usually involve huge losses.

The real difficulty would lie in the variability of the volume of corn marketed as grain. During 1921-22 to 1929-30 approximately 79 per cent of the corn was reported as of merchandisable grade; about 18 per cent left the county where grown, and the receipts in the ten primary markets represented only around 9 per cent of the total corn crop; and the average monthly visible supply was less than 10 per cent of the receipts at ten primary markets.¹ Behind the visible corn supply is always a huge country reserve of merchandisable corn. In the corn belt are two areas that market their corn mostly as grain. But over the entire corn belt, under the influence of price, more or less corn is shipped to market rather than fed to animals. Unless a central organization had some control over the disposition of corn by farmers, if the visible supply in terminals were held low, the terminal price high, and the Corn Corporation attempted to maintain an acceptance price, this would be followed by a flood of corn to terminals. If farmers were left to their own devices, unless the price of hogs could be maintained relatively high, a high price of cash corn would promptly result in stimulation of marketing of corn as grain. In any season where a half a billion bushels of corn would leave the counties where grown, an additional 100-200 million bushels would be added on slight price stimulation. Under these circumstances, a continuation of the policy of buying corn, in order to keep the price high and the visible supply low, would result in accumulation of corn in the hands of the central marketing agency. The

¹ See above, Table 7, p. 132.

result would be that the otherwise carryover and an additional amount of corn attracted by high price would be found in possession of the co-operative association or stabilization corporation at the end of the crop year. Stabilization of price of the unaltered volume of corn leaving the county where grown might be practicable: the hitch would be in keeping that volume unexpanded.

Regarding corn supplies, dispositions, exports, and prices as one will, one is finally driven to the acreage as the determining factor. Even with effective co-ordination in the marketing of corn and hogs, unless there is some restraint of the corn acreage, it seems quite illusory to expect any notable increase in the weighted farm price of corn through the operation of measures designed to modify the marketing of corn within a season or control the carryover from one crop year to another.

There is thus little to indicate that a Corn Corporation could stabilize the price of corn through a corn crop year at a net profit to the weighted price. Also, there is little to indicate that a Corn Corporation could stabilize the price of corn over a series of years, at a net profit. Such a Corporation, superlatively managed and adequately financed, could probably make a profit on opportunistic merchandising of corn, on speculation in cash corn, and by dealing in corn futures. There is no way of suggesting to what extent, in terms of addition to the weighted price of corn, success might be achievable under such monopolistic tactics. In its first two years, the Farm Board has done nothing directly for corn, so far as is known. But to judge by the stabilization of wheat, as much has been done for corn as would have been accomplished if the corn price had been stabilized.

The record of results of price stabilizations of agricultural products since the World War is worse than discouraging, both with respect to emergency measures and long-term program. Short crops now and then will bring

high prices to the corn belt, and a coexistent system of stabilization might further enhance the returns of short crops. Price stabilization by withholding of supplies is in fact predicated on crop failures. No agriculture can exist on the profits of calamity.

In our judgment, the only way effectively to stabilize and improve the farm price of hogs is to restrain production, which implies restraint of breeding. If this could be accomplished, the short-term swings and the seasonal fluctuations in live-hog prices would be automatically relieved for the most part. Thereafter, the problem of the visible supply of cold storage stocks of hog products would be relatively easy of solution. In the absence of control of corn acreage and hog breeding, with continuation of the misguided use of the corn-hog ratio to determine the plane of production, nothing is to be expected except continuing gluts and shortages, price cycles and wide fluctuations from time to time. Taking corn and hogs together, supply is to a large extent under the control of producers in the corn belt. If producers cannot be brought to see the advantage of smaller crops of corn and hogs with larger gross returns for the crops, stabilizing tactics under a Farm Board will have little prospect of increasing the weighted price of hogs, but a large prospect of dissipating governmental funds.¹

A critical view of stabilization was expressed by J. D. Black² which strikes us as sound:

Viewed as the framework for a program of general aid and guidance to agriculture, the stabilization corporation plan has much to recommend it. Its two major specific devices, the enlarging of the carryover of large crops, and insurance of crops against price decline, will not work as intended by their sponsors; but if the act establishing them is broadly enough framed, it may become in time the basis for some very worthwhile assistance to agriculture.

¹ Cf. editorial in *Wallaces' Farmer*, January 18, 1930, p. 6.

² *Agricultural Reform in the United States*, p. 487.

CHAPTER XII

INTERNAL METHODS OF FARM RELIEF

Introduction: Administrative practicability; Initial success; Trend of effect on agriculture; Price crises on commodity markets; Reactions of consumers—Internal alleviations—Technical improvements in management and practice: Advances in mechanical appliances in corn raising; Advances in mechanical appliances in hog raising; Raising hogs for protein; Breeding stock and the rate of reproduction; Increased efficiency in feeding; Scope of an efficient national swine husbandry; Collateral improvements in other branches of animal husbandry—Relation of factors of production to area: Consolidation of larger farms; Management and practice on enlarged farms—Adjustment of supply to demand: Controlled breeding of hogs for market; Contraction of corn acreage; Expansion of grass land—Potential expansion of demand—Tendencies making for reduction of corn acreage—Analogies and contrasts with industry—Consequences of contraction—Conclusions

INTRODUCTION

We have grouped the equalization fee, the export debenture, the farm allotment plan, and price stabilization under "external" methods of farm relief. We propose in this chapter to present, examine, and appraise procedures which may be termed "internal" methods of farm relief.

Opponents of the remedial measures which we have termed external methods of farm relief are divided into two groups. Opponents in the first group reject the equalization fee, the export debenture, the farm allotment plan, and price stabilization, not on grounds of pragmatism but on the basis of traditional (orthodox, so-called) economic theory. Quite irrespective of the considered effects on agriculture, or on society in general, the named devices are regarded as "unsound," interference with "natural law"—"government in business." This feeling is both deep and widespread and its influence is not modified by the observation that business men are wont to ascribe to the so-called "economic laws" a validity not recognized by professional economists.

Opponents in the second group reject the equalization fee, the export debenture, the farm allotment plan, and price stabilization on grounds of inductive reasoning. The workability of the devices, purely as administrative procedures, is questioned. Still more, the effects on agriculture itself are drawn into the discussion and the devices are rejected as not in the true interest of agriculture.

Those who find themselves unable to support the proposed external methods of farm relief—the equalization fee, the export debenture,¹ farm allotment, price stabilization—on inductive grounds, or who feel constrained actively to oppose them, thus base their position on practical considerations. At the risk of repetition, these may be summarized as a background to the consideration of internal methods of relief. These reasons for opposition may be conveniently grouped under several headings.

ADMINISTRATIVE PRACTICABILITY

Many question the administrative practicability of the equalization fee and the farm allotment plan, regarding the operations as too complex in detail, too far-flung in space, too far-reaching in time, and too ponderous in mass to lie within the managerial ability and foresight of any group of men. The administrative difficulties would be least for grains and most for animal products, least for a crop with a principal product and most for a crop with joint products. The separation of a high domestic price level from a lower foreign price level in a net exporting

¹ Political exigencies have impelled the proponents of the equalization fee and of the export debenture to adopt an exclusive attitude. But gradually it is becoming clear to those who believe in external methods of farm relief as a broad proposition that no one plan would be best. The equalization fee sounds best for wheat, the farm allotment plan best for cotton, the export debenture best for butter, pork, and poultry. Some commentators clearly incline to the view that under a policy of farm relief by external methods all the methods would need to be made available. If we believe in one of them, this is likely to extend to all of them. Cf. J. D. Black, *Agricultural Reform in the United States*, p. 486.

creditor country is regarded as an experiment for which the available precedents are not convincingly applicable. The export debenture and price stabilization, added to the existing methods of trade, do not provoke the same degree of distrust.

INITIAL SUCCESS

Granted administrative practicability in the early operations, many students of markets and prices doubt whether such increases in farm prices as could be secured, even initially, would correspond to the natural (or aroused) expectations of the producing class. Since it is natural to feel that only a substantial increase in price would justify extraordinary measures, it is not believed that such substantial price increase could be attained, even for the first crop. In our view, an initial success in terms of an increase in farm price (tariff wall permitting) could be obtained with wheat, much less certainly with corn, and only improbably with hogs. Of course, much depends upon the extent of price increase that would be regarded as substantial and satisfying. We take it that bringing farm prices of corn and hogs back to the pre-war level of relative purchasing power, in terms of the goods and services now desired on the farm, would not generally be regarded as sufficient, since high labor costs, taxes, and interest charges would remain to reduce net income. Farmers in the corn belt are gradually coming to the class view that increasing efficiency per man or per acre is rewarded only if it leads to a higher plane of living on the farm. But farmers will still be found who would tolerate low purchasing power of products and high taxes and interest if they feel that a speculative chance exists for land values to double during the next ten years. This, however, lies outside the degree of price success reasonably to be expected.

TREND OF EFFECT ON AGRICULTURE

Granted initial success, most observers believe that higher farm prices with the established policy of higher prices would bring expansion. That such expansion is geographically and technically feasible was made evident by W. J. Spillman:

We have enormous areas of land which have recently been in cultivation and are now lying idle awaiting only the promise of a profit in order to come back into cultivation. We have other large areas that would come into cultivation if the cultivation were made profitable.¹

Such expansion would include reinflation of land values, revival of speculation in land and of promotion of land settlement, overextension of acreage and operations, and consequent exaggeration of the surplus problem through increase in the surplus. In short, it is felt that the initially successful application of the equalization fee, or the export debenture, would provoke a boom in agriculture like that which followed the World War, with the inevitable subsequent result of reaction. With enlargement of supply, prices would fall and the increase obtained initially would recede or be obliterated. Such a sequence of events would nullify the painful adjustments of the past ten years, enlarge submarginal operations in agriculture (including submarginal lands, submarginal methods, and submarginal farmers), and create new maladjustments that would later have to pass through distressing and costly liquidations.

PRICE CRISES ON COMMODITY MARKETS

Students of markets are fearful that a Farm Board and corporations with large capital engaged in holding

¹ *Balancing the Farm Output*, p. 82. The advocates of external methods of relief have generally conceded the influence in the direction of expansion, but have sought to indicate that deterrent measures for controlling it ought to be available and applicable.

large amounts of commodities might become top-heavy. This fear applies especially to operations under the equalization fee and price stabilization. The Farm Board, or its operating corporations, would have to carry whatever amounts of commodities were necessary to sustain the price, and this in the face of rising production at home and abroad. The government might be "holding the bag" for producers, distributors, manufacturers, exporters, and indirectly even for foreign countries. Enormous amounts of money might readily be involved. Coincident with abundant production abroad, the surpluses of commodities would become unwieldy, even if adequately financed. Possibly Congressional support might be withdrawn. The holding corporations would be continuously exposed to an overbought situation; the influence and interest of traders would be in the opposite direction. Either from sheer weight of the load, or because of some intervening circumstance, the price would break and a debacle would follow on commodity exchanges and in cash markets. In short, a crisis would develop on commodity exchanges. It is not merely the tying up of a large volume of government money and possibly a large loss of government money; it is the collapse of the program of price control and of marketing operations under the Board that would be feared. The first two years' operations of the Farm Board have served to strengthen such apprehensions.

THE REACTIONS OF CONSUMERS

This is a point upon which particular emphasis has been laid in the vetoes of the McNary-Haugen bill. In our judgment, the possible reactions of consumers have been overstressed. No one can forecast to what extent a particular increase in farm prices would eventuate in increases in prices of foodstuffs as purchased by consum-

ers. Consumers' reactions to higher food prices depend upon the scale of living and upon the proportion of income expended for foodstuffs. With a high standard of living and a relatively low proportion of income expended for foodstuffs, as is the situation in this country (a low "food-line balance"), extreme reactions of consumers seem to us unlikely.¹ But if price-raising procedures were in operation at a time of widespread industrial unemployment (as in 1930-32), consumers would react with a buyers' boycott. Yet, in the nature of the measures, such experiments would be made in a period of high industrial prosperity. Some resentment would be aroused against higher prices;² but to some extent consumers have been prepared for higher prices because these seem to be implied in the legislation already passed. We do not feel that the failure of any plan would arise directly from consumers' reactions. Nor do we regard probable increases in the retail prices of the foodstuffs in question as the outstanding objection to these schemes.

For ourselves (disregarding the contingency of commodity price crises) the outcome most likely to be anticipated would be such an increase in production in this country, with continuation of existing production trends in other countries, as substantially to expand supplies in the readily interconnected markets of the world. This would provoke decline of prices of the commodities concerned. With enlarged American exportable surplus, the higher domestic price secured on top of the lowered world price might represent little improvement over the

¹ On the whole, meats constitute one of the most flexible elements in the diet: not only the total quantity purchased, but the proportions of the different meats, the choice of cuts, and the degree of utilization vary from time to time as prices and purchasing power change. The better the economic conditions, the greater tends to be the divergence among the prices of the various cuts. Business depression is likely to be reflected in a recession in the premiums on choice cuts as compared with those less prized.

² An attempted boycott against high beef prices collapsed a couple of years ago.

price that would naturally have ruled on the smaller scale of production. The double standard of prices might not prevail and would not avail. In short, the campaign for higher domestic price would be partially or completely nullified by overproduction, with the average farmer perhaps no better off, the surplus problem of farmers collectively intensified, and distressing adjustments extended over a prolonged period.

INTERNAL ALLEVIATIONS

What we term internal methods correspond, with some extension, to what Black has termed "assisted *laissez faire*."¹ The outstanding distinction between "internal" and "external" lies in the nature of governmental participation. In the external methods we find governmental participation expressed in official direction, participation, and administration. The equalization fee, the farm allotment plan, and price stabilization, in the very nature of their operations, would need to be operated by a governmental commission. Some of the proponents of the export debenture have argued that this device, like an import tariff, would operate automatically. Despite this, we classify the export debenture as an external method of farm relief because we are convinced the plan would need to be administered by an official export corporation. That the distinguishing feature lies in governmental

¹The improvements in management and practice and in adjustment of supply to demand which are presented in some detail in this chapter are quite generally recognized; they are included or implied in the following statement of J. D. Black (*Agricultural Reform in the United States*, p. 488):

"The specific reforms and readjustments needed in agricultural production are larger family-sized farms; more use of power and machinery; more extensive cultivation of the poorer lands, or their conversion to pasture or forest; more intensive cultivation of the better land, in terms of capital goods, not labor; heavier feeding of the best livestock and less feeding of poor livestock; more specialization (less diversification) in the areas of general farming; more livestock in most of the areas now producing one or a few crops; and quicker adjustments to fundamental changes in economic conditions such as competition with other areas at home or abroad."

Compare also pp. 36-38 of the same.

relations is illustrated in the Patterson Butter Plan in Australia. If this plan were administered by the government, it would rank as an external method; but since it is administered by the producers themselves, it remains an internal method.

The various internal methods to be presented require governmental guidance and assistance. Here are included credit, establishment of standards, maintenance of grades, technical assistance in experiments in laboratories and in fields, the support of domestic and foreign crop-reporting and fact-finding organizations, and a marketing board for guidance in the practical problems of planning for and disposition of crops. Implied is governmental support and assistance in many ways and in more ways probably than are included in the foregoing list; but *not governmental administration*. We have no doubt that critics will urge that the distinction contains special pleading and is arbitrary and illogical. We are convinced that the distinction embodies a trustworthy rule. The Interstate Commerce Commission regulates and supervises railway operations; it does not administer them.

In what we shall have to say on farm relief in practical terms, it seems advantageous for the most part to use one state in illustration, rather than to try to spread the argument over the corn belt. Iowa is probably the best state for illustration. There are, of course, substantial differences between the several states in the corn belt. Of all the states in the corn belt, wheat is relatively least important in Iowa, and corn most important. East and south of Iowa, soft red winter wheat is an important alternative crop; north and west of Iowa is spring wheat; west and southwest of Iowa is hard winter wheat. Probably the most difficult situation in oats is in Iowa. Iowa is a feeder state, like Minnesota, Missouri, and the states to the east; the corn region to the west has considerable range husbandry left. Iowa occupies middle ground in

regard to beef cattle and dairying. Iowa has possibly the richest soil of any one of the states and suffers no more than her share of climatic hazards. The post-war boom was probably as bad in Iowa as in any other state. All in all, Iowa would seem to constitute a representative region to be employed in illustration.

Before proceeding with the discussion of the internal methods of farm relief applicable to corn and hogs in the corn belt, it is important to indicate the extent to which, despite its name, the corn belt is not dependent on corn and hogs. Table 33 presents the gross income to Iowa farmers from the ten outstanding agricultural commodities.

This table illustrates how important are the several sources of farm income outside of corn and hogs. Corn and hogs together contributed 47.4 per cent in their year of lowest share in the total income (1928) and 52.5 per cent in their year of highest share in the total income (1926). For the entire period 1921-30 the income from corn and hogs was 49.4 per cent of the total income.

An examination of the interesting material in this table (taking into account the absolute values and their relative positions to each other and to the annual totals) reveals no significant preponderance of improvement in any one of the items of income listed. The proportion of the total contributed by corn and hogs combined varied irregularly but not significantly; of this total the proportion contributed by hogs tended to rise and that contributed by corn to decline. The table not only illustrates how numerous are the sources of farm income in Iowa, but it illustrates also that any plan for farm relief to be applied to corn and hogs must take many other farm products into account. Above all, the table makes it clear that the problem is not to be attacked by cutting down hogs, corn, and oats and enlarging the other crops. The income for 1931 is substantially lower than that for 1930.

TABLE 33.—ESTIMATED GROSS INCOME TO IOWA FARMERS FROM TEN AGRICULTURAL COMMODITIES, 1921-30*
 (Thousand dollars)

Commodity	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930*
Hogs	164,127	199,801	213,138	233,447	278,884	305,750	266,088	262,938	279,568	251,684
Cattle and calves	105,476	109,617	137,444	141,417	147,337	153,748	166,478	158,871	172,498	150,662
Sheep	3,305	2,912	3,548	4,656	4,422	4,695	5,298	4,870	4,944	4,367
Corn	70,170	73,024	86,361	73,893	50,573	71,955	70,219	65,975	88,305	59,515
Oats	24,156	22,743	30,630	37,529	31,182	24,495	23,091	24,775	28,345	19,103
Wheat	7,521	9,064	9,082	7,733	5,893	6,128	6,339	5,736	6,001	4,500
Barley	895	746	784	897	1,221	1,163	1,691	4,344	3,345	2,330
Butter ^b	79,619	79,300	86,394	86,184	96,356	106,631	114,714	119,572	125,016	103,380
Eggs	21,177	24,135	27,466	24,084	27,384	30,098	24,258	30,205	32,015	23,313
Poultry	11,003	12,565	14,271	12,516	12,886	14,921	14,723	16,795	16,595	12,678
Total	487,449	533,907	609,118	622,356	656,138	719,584	692,899	694,081	756,632	631,532

* Data for 1921-24 from Knute Bjorka, *Income to Iowa Agriculture, 1920 to 1926* (Iowa State Agricultural Experiment Station Circular 104), June 1927, p. 5; data for 1925-30 furnished by Iowa State Agricultural Experiment Station.

^a Preliminary estimate, subject to revision.

^b Data for butter include income from creamery butter, ice cream, sweet cream, market milk, cheese, cottage cheese, and condensed milk, converted to butter equivalent.

Comparable material is not available for the other states of the corn belt. But with full allowance for differences in agricultural occupations mentioned above, it may be accepted that in all the states in the corn belt the highly important corn and hogs predominate but do not overshadow all other branches of agriculture.

The future commercial problems of farmers in the corn belt depend largely on the outcome of four trends: the trend of the general price level, the trend of prices of corn and hogs, the trend of the purchasing power of corn and hogs, and the trend of the cost of production of corn and hogs. It is assumed that the general price level of raw materials will rise, following subsidence of the cyclical depression. Whether the trend of prices of corn and hogs will rise more or less than the general price level depends in part directly on the producers of corn and hogs. Whether the purchasing power of corn and hogs will change relatively more or less than the prices depends in part upon the future spread between prices of raw materials and finished goods. The trend of cost of production of corn and hogs will be downward, the extent of decline depending on the application made of the operative developments making for lower costs. The outcome of these trends, together with possible changes in demand for corn and hogs, will modify the supply of corn and hogs. To a considerable extent the farmers of the corn belt have it in their power to make the best of a difficult transitional period, but this cannot be done by judging the future of the corn belt by the extractive period before the World War.

The internal methods of farm relief may be grouped under two headings: (1) technical improvements in farm management and agricultural practice; (2) adjustment of market supply to effective demand.¹ These should be con-

¹ We do not include co-operative marketing, tax reform, and mortgage assistance under internal methods of farm relief. Co-operative marketing we accept as a going program. Tax reform is an obvious need. Mortgage assistance

sidered in the order stated, since to some extent adjustment of supply to demand is conditioned on technical improvements in management and practice. The internal methods of amelioration of agricultural distress are inter-related and cumulative. No one of them is spectacular; but they do not controvert each other and all are additive. They aim at increasing the gross income, lowering the cost of operation, and reducing the fixed charges of the farm. Applied to the mass in the same sense as to the individual, the measure is net profit instead of volume. To make agriculture operatively remunerative, it is necessary to enlarge the plant per man, to increase the outturn per unit of investment, per unit of area, and per man, and to lower the cost per unit of outturn.

Broadly considered, such a program of profit versus volume contains several implications that must be indicated in advance. These include suspension and deferment of settlement of public land, return to bush or forest of some land now in farms, and continuation of migration from farm to town. So long as the "surplus problem" is acute in so many lines of agriculture, further land settlement with use of public funds ought to be suspended, which merely requires cessation for the time being of Congressional appropriations for new reclamations. Reforestation, however, is not a passive problem but requires appropriations. The drift from country to city is both misunderstood and exaggerated. Farmers are always moving in and moving out; it is the net result that is significant.¹ In the drift from country to town are

is an emergency problem, an inheritance of the post-war land boom which has assumed the complexion of a prolonged emergency because so large a number of mortgages fell due in 1930. These are all highly important matters, demanding attention in connection with, or even preliminary to, the application of internal methods of farm relief. While we do not term tax reform and mortgage assistance farm relief in the sense of procedure, we are fully in accord with the view that heavy taxes and interest charges are among the most pressing burdens resting on farmers.

¹ Cf. C. J. Galpin, *Agriculture Yearbook*, 1927, pp. 514-16.

both salutary and harmful elements. Some signs of a return drift to the country are observed in 1931; but with restoration of prosperity, the drift from country to town will be resumed.

TECHNICAL IMPROVEMENTS IN MANAGEMENT AND PRACTICE

It will suffice below to indicate, without exhaustive comment, the available improvements in agricultural management and practice, designed to enlarge outturn per area and per man and to lower cost per unit of product. We confine ourselves to verified improvements; none are hypothetical. They have all received practical demonstration, first in experiment stations or in extension services supervised by national and state departments of agriculture, and subsequently placed into practical operation on a large number of farms, of which the list is rapidly growing. When these improvements in management and practice become the common property of farmers in the corn belt, the efficiency of the average farm will be raised to the plane of efficiency of the best fifth of the farmers of today.

ADVANCES IN MECHANICAL APPLIANCES IN CORN RAISING

Available and mechanically perfected are two-, three-, and four-row corn planters and cultivators, one- and two-row rotary hoes of different widths, one- and two-row huskers, husking and shelling combines, and harvesting and cutting combines. These are being taken up in different parts of the corn belt, with regional variations which suggest that financial considerations and farming prejudices influence decisions as much as do considerations of topography and soil. When improved farm implements are introduced, farmers attempt to apply them to the farms of existing size, though the new implements

will influence the initial size of the new farms. Later, and especially as the implements become perfected, it becomes clear that farms of the average size are too small for the efficient use of the new implements. This divides farmers into two classes: those who retreat from the new implements and stick to the small farms, and those who seek to enlarge their farms in order to use the new implements. As old farmers drop out, the first class contracts and the second class expands. Wheat growers have progressed farther than corn growers, both at home and abroad, in the mechanization of their agriculture and in expansion of the size of farms to fit the mechanization.¹ Whether the business depression will accelerate or retard the mechanization of corn growing and the development of larger corn farms after the depression is over remains to be seen. We infer mechanization will be accelerated.

The implements drawn by a tractor move at a faster pace than those drawn by horses and cover a wider swath. When the field is planted with a four-row planter, cultivated twice with a wide rotating hoe, and two or three times with the four-row cultivator, and finally harvested with a two-row husker and the land prepared for the next crop by deep plowing under tractor power, the labor costs per acre are substantially reduced and the area handled per man greatly extended. A two-rôle corn combine,² a husking and shelling implement, is now on the market, but can be used only on dry corn below 20 per cent moisture. Capital goes into the new machinery, of course, and the machinery must be appropriate to the area. Also, the farmer loses a farm market for oats and must purchase fuel instead of raising it. But with aver-

¹ An interesting discussion of what may be termed the "behaviorism" of agricultural mechanization is to be found in an article by G. A. Studensky, "Entwicklungslinien der landwirtschaftlichen Weltproduktion," *Weltwirtschaftliches Archiv*, April 1930, XXXI, 471-90.

² Cf. editorial in *Wallaces' Farmer*, November 8, 1930, p. 7.

age-to-good soils on fields that are not too hilly, the efficiency and economy secured are outstanding.

The available experiences indicate not only substantial reduction in expense per acre but also improvement in yield. Advances in mechanical appliances indeed make the advantage of improvement in corn strains through seed selection more promising than under less efficient methods of raising corn. To select strains of corn of quicker maturity and larger yield; to employ methods of lower cost of planting, cultivating, and harvesting; to follow rotations that not merely conserve but improve soil fertility; and to develop the diversity best suited to each region—these are the managerial objectives of the corn belt. In short, it has become practicable to raise more corn and better corn at less expense per acre. This means, still more, increased outturn per man; while the advantages of mechanization apply per acre, they apply most significantly per man.¹

ADVANCES IN MECHANICAL APPLIANCES IN HOG RAISING

These are less spectacular but very important. The housing quarters provided for swine should afford protection against the elements, should be constructed in accordance with sanitary standards, and so arranged as to facilitate cleaning at low cost. Quarters corresponding to "maternity wards" should be provided for farrowing

¹ Whether the full advantage of mechanization in the raising of corn is further promoted by intensive use of chemical fertilizers remains to be determined in plot experiments and in field practice. We understand it is now practicable, at insignificant added cost, to apply a mixed blend of chemical fertilizers with corn when planted. This has a particular advantage in facilitating growth in the early weeks of the life of the plant, enabling the shoots to "get the jump," so to speak, and make use of every climatic advantage, usually with a resultant increase in yield per acre. (Placing fertilizer in the hill recalls the early Colonial practice, learned from the Indians, of planting corn with a fish in each hill for fertilizer.) If this brings about an increased yield per acre at relatively low cost, that would mean an increased gross and net return. Should this develop as accepted practice, it would imply a further contraction of acreage than would otherwise be the case.

sows, to facilitate the care of the newborn litter. The care of the litter during the first week of life is one of the most important points in swine husbandry. Feed-lots should be designed with sanitation in view, because if they cannot cheaply be kept sanitary they will be left unsanitary.¹ Self-feeders and other forms of mechanical equipment, such as grinders, designed to lower the cost and increase the efficiency of feeding operations, should be provided on a scale corresponding to the size of the drove. Protection from the elements, reduction of mortality in the newborn, prevention of infectious diseases, and reduction of cost of feeding are all dependent to some extent on mechanical appliances. Immunization against hog cholera is in effect a mechanical appliance. By nature, the hog is a scavenger, but this is not the trait upon which rests the best commercial value of the animal. It is catastrophic when hog cholera kills half the pigs; but it is not realized in how many ways and to what extent various untoward occurrences outside of disease operate to reduce the ratio of hogs marketed to pigs born and of hogs marketed to breeding stock.

RAISING HOGS FOR PROTEIN

In several places we have referred to the circumstance that farmers in the corn belt must raise hogs for protein and not for fat. Compulsion is imposed on them by irreversible shifts in consumers' preferences. More and more, consumers prefer small cuts from lean carcasses of animals killed before they reach anatomical maturity.

These preferences are expressions of taste and of culinary convenience. All preparation of meats may be classed under broiling, roasting, or boiling.² Tastes differ

¹ The McLean system is a combination of self-feeding and sanitation: sanitation shortens the time necessary to bring hogs to market maturity.

² Frying would be regarded as the equivalent of broiling or roasting, since it is used with meats adapted to either broiling or roasting.

between broiling and roasting, but boiling ranks lowest in the bringing out of the flavors desired by most consumers of meats. In the average household, also, broiling, roasting, and boiling rank in that order in respect to convenience of preparation. In general, consumers are prepared to pay for these preferences and the price ranges correspond with gustatory and culinary classification. The argument becomes more convincing when one applies to pork the marketing experiences drawn from beef and mutton.

In the case of sheep, the shift in preference is practically complete; lamb has practically excluded other forms of sheep meat from the American table. What we call lamb is really baby mutton, since the standard animals weigh 80-90 pounds and are 5-6 months of age. Very few wethers are now finished for market in the United States. The flesh of the used breeding stock ranks low on the American table, and an increasing proportion of old ewes fails to find disposition on the food markets.

In the case of cattle, the same shift is well under way. Baby beef is becoming the standard beef. A small number of stall-fed steers are finished for the market at three or four years of age, the meats going largely to high-priced public eating-places and clubs. Feeders come from the ranges at a much earlier age than they did before the war. The baby beef now being more and more preferred comes from animals about 14-18 months old, weighing 800-1,000 pounds. Some specialists who start forced feeding directly after weaning turn out baby heaves of 700 pounds at 8-10 months of age. Veal has fewer friends than lamb, except among the foreign population. The flesh of the used breeding stock and of dairy cows, prepared for the table mostly by boiling, has few friends outside of the foreign population who are still willing to practice the tedious art of making stews. A considerable

fraction of this meat now goes into sausages, mixed with pork of corresponding type.

The same shift in consumers' preferences is under way for pork, but has not progressed as far as it has for beef, mutton, and poultry. Nevertheless, it is under way and further extension is inevitable. Public preference for fresh pork is gravitating in the direction of pigs four or five months of age. This has long been the situation in England where the "porker" of 130-150 pounds is preferred for fresh pork. The lean hams, bacon, and shoulders now preferred come from pigs of six months of age and weighing not over 200 pounds.¹ The used breeding stock furnishes hams and shoulders too coarse and fat to please the fastidious public, and the bacon is entirely too heavy in fat to conform to conventional taste. More and more (apart from uses in sausage) the flesh of the used breeding stock must go into lard, mess pork, and pickled pork.

The clinching fact in the argument is this: public taste coincides with efficiency in animal husbandry. It is in smaller animals which have not reached anatomical maturity that the husbandmen make the highest recovery of edible protein from nutrients used. It "goes against the grain" of agriculturists to have animals slaughtered before they are fully grown, and for a half-century specialists in nutrition have made slow progress in convincing husbandmen that a trend of increasing and decreasing returns applies in the life of the domesticated animal. The war regulations of the European countries were based specifically upon the fact that the highest return is achieved before animals reach anatomical maturity. If the land area used in raising hogs is to bring anything approaching maximum returns, hogs must be

¹ In Appendix C are data relating to proportions of protein and fat in hogs of different weights.

raised for protein instead of for fat, and the husbandry based upon the maximum (cost) recovery of edible protein. It happens, as a very favorable circumstance, that public taste and culinary convenience agree with the physiology of animal nutrition.

THE BREEDING STOCK AND THE RATE OF REPRODUCTION

The best commercial results are secured with blooded boars. This does not mean striving for full-bloods in the drove. Indeed, possibly droves of crossbreds give better results than purebreds. For the time being, continuous improvement will be secured with the use of full-blooded boars and part-blooded sows. Just as the cattle of the range country were brought up to seven-eighths Hereford, so the farm run of hogs of any variety can by selection be brought up to such a proportion of the pure blood as to yield most of the benefits of blooded stock. Of the several qualities of pure-blooded stock, high fecundity is one of the most important. Only second to this is milk secretion, which varies as much in sows as in cows. The size of the litter at birth, the size of the litter than can be suckled by the sow until the normal period of weaning, and the number of farrowings without decline in the size of the litter—these are the outstanding factors of selection in the breeding stock. Gilts for future breeding should be selected from sows of demonstrated characteristics. Lactation is as important in sows as in milch cows; breeding sows should be selected from large litters and should have twelve mammary glands. The limiting factor is number of nipples rather than milk-building metabolism, since feed will take care of the latter with selected breeding strains.¹

Variations in these factors (together with feeding practices to be mentioned below) are the cause of wide

¹ Cf. Guy Bush, "What Makes Brood Sows Good?" *Wallaces' Farmer*, May 31, 1930, p. 3.

differences in operative returns on different farms. As an example of poor farming, a drove may yield three merchandised hogs per breeding sow per year; as an example of good farming, a drove may yield ten merchandised hogs per breeding sow per year. The larger the breeding herd and the smaller the relative number of merchandised hogs, the higher the maintenance costs and the lower the gross returns. The smaller the breeding herd and the larger the relative number of merchandised hogs, the lower the maintenance costs and the higher the gross returns.

INCREASED EFFICIENCY IN FEEDING

With selected animals fed according to modern knowledge of the physiology of nutrition, the feeding term is shortened and the yield per unit of nutrients is increased. The litters should be fed during lactation, and to a considerable extent the rate of growth after weaning depends upon the rate of growth established during the suckling term. The diet of the sow should be balanced, especially in respect to vitamins and mineral constituents; the supplementary feeding of the pigs during lactation should have especial regard for vitamins, mineral elements, and the high plane of protein requirements during the growing period. Following weaning, the rule should be forced feeding with a balanced ration. This balanced ration aims to co-ordinate the growth of skeleton and muscular system and to finish the pig as he grows, so to speak, rather than to finish him with a fattening ration after he is grown. Mineral elements, vitamins, and supplementary proteins are indispensable in the balanced ration. With a balanced ration, the proportion of nutrients recovered as edible hog products is high and the corn required for each hundred pounds of live hogs is low. Market maturity need not be over 180 days from birth, 100-120 days from weaning, to give a prime animal weighing 200-220

pounds, with the conformation and proportion of lean to fat in hams, bacon, shoulders, and loins adapted to the high-grade trade. Under the best of conditions adapted to routine practice, a hundredweight of hogs can be produced from 6 bushels of corn; when growing pigs are not given balanced rations and are finished for the market by hogging down a cornfield, the hundred pounds of live hogs may represent three times that much corn.

SCOPE OF AN EFFICIENT NATIONAL SWINE HUSBANDRY

Considered from the standpoint of farm management, it seems clear that in the corn belt long-term prosperity is to be secured and speculative fluctuations eliminated only by the stabilization of hog raising as one of the components of diversified agriculture. There are areas where the raising of feeder pigs is practicable and other areas where hogs are raised solely for subsistence of the family. But for the most part, hogs should be one of several cash crops of diversified farming. Therefore, the breeding stock and the number annually finished for market ought to be relatively constant and comprise a relatively constant proportion of gilts, barrows, and sows. Feeding and breeding should not be determined by the corn-hog ratio. Corn ought to be combined with small grains, with the addition of supplementary protein. With the use of mineral rations and self-feeders, the highest ratio of recovery of feedstuffs in carcass weight would be sought. With corn scarce and high, small grains would be employed more freely; with corn plentiful and cheap, corn would be employed more freely. The rations and the weights to which the animals were to be fed would thus rest upon a series of factors, in part individual to the farmer, and not upon the corn-hog ratio.

To improve the varieties of hogs and to control diseases; to increase the number in the litter brought to

market maturity; to shorten the term of feeding; to secure larger yields in weight of hogs per weight of nutrients; to increase the turnover of merchandised hogs per area and per man—these are the managerial objectives. We hear a great deal of “ton-litter contests” in which a ton live weight of the single litter at six months of age represents the qualification for entrance. So far as is known, there are no ton-litter droves in the United States. But certainly half that standard is practicable for droves. Such an outturn, which is entirely practicable with control of infectious diseases, represents probably close to double the efficiency of the present breeding stock of hogs in terms of market output. The illustration is of course merely an arbitrary one; but a great many farmers are doing as well as this and a considerable number are doing better.¹

COLLATERAL IMPROVEMENTS IN OTHER BRANCHES OF ANIMAL HUSBANDRY

Analogous and corresponding improvements find application to all domesticated animals. The same methods of selection, management, and feeding that bring butcher hogs to market maturity at six months are used in the production of baby beef. Pure blood and the selection of crosses, strains, and grades are as important with cattle as with hogs; especially important is breeding for early market maturity. Sheep are increasing in the corn belt, dual-purpose sheep in which both the clip and the lamb crop are important. The price of lambs depends on quality, and it is largely in the hands of the feeder whether he markets what the public classifies as mature lamb instead of young mutton. Poultry is commonly regarded as a side line in the corn belt, but it is an important source of cash income. Possibly the majority of

¹ For a computation illustrating the saving of corn through improvements in husbandry practice, see Appendix D, p. 636.

hens in the corn belt are "boarders," whose annual outturn of eggs would not pay for their feed at commercial rates. Since the turnover is so rapid with poultry and the methods of selection so well established with trap-nesting, it is practicable within a few years to raise the average outturn of eggs by 50 eggs per hen per annum. Finally, milk production in the corn belt ought to be substantially increased. The average milk production per cow per year in the country is probably not over 4,800 pounds; in the best states it is over 7,000 pounds. Through selection and feeding, it ought to be possible for any state in the corn belt to increase the average annual outturn of milk per cow per year by a thousand pounds within the next decade. This applies of course to cows being used regularly for milk production and not to cows of beef strain which are milked only incidentally.

These improvements in animal husbandry all go together. They rest upon the same principles of selection, breeding, and feeding; the breeding stock is reduced relative to the volume of market production, the feed requirements are reduced and the outturn augmented, costs decline and gross income rises.¹

It is sometimes urged, largely on grounds of farm management, that the corn belt should reduce the growing of grain as a cash crop and increase the outturn of hogs, cattle, and sheep. Leaving wheat out of consideration, the proponents of this view seek to have the growing of grain reduced to the needs of the work animals and industries of the corn belt. There would be fewer farmers who raise more grain than they feed to their own animals, fewer farmers who raise grain to finish feeders shipped in from outside the corn belt, and more farmers endeavor-

¹ Cf. O. E. Baker, "Changes in Production and Consumption of Our Farm Products and the Trend in Population," *The Annals*, March 1929, CXLII, 97-146, and "The Outlook for Land Utilization in the United States," *Journal of Farm Economics*, April 1931, XIII, 203-30.

ing to market practically the entire output of their acreage in the form of animals and animal products. In order to do this along lines of accustomed farm management, the acreage in sweet clover, alfalfa, and soy beans would be extended. Illinois and Iowa would be the states most directly affected. A widespread change in this direction would bring about a substantial increase in the number of cattle, hogs, and sheep sent to market. Possibly the outturn of cattle and sheep might be somewhat expanded at a net profit to the corn belt, but it seems quite certain that a significant increase in the outturn of hogs would not yield a net profit to the region. In our view, what is needed is not a further shift from cash grain crops to fodder crops to turn out more animals, but a reduction in the growing of corn and oats and an increase in soil crops.

RELATION OF FACTORS OF PRODUCTION TO AREA

The technical improvements in management and practice bring about a dislocation of the customary relations of working forces to farm area. When the outturn of plant crops and animal products per area is increased, this provokes a marketing problem to take care of the increased outturn. When the outturn of plant crops and animal products per man is increased, this involves in addition the problem of employment. With the use of machinery and other methods of efficiency, head work is increased but hand work is decreased. The farm that previously gave full employment to the farmer and his family no longer gives full employment to a family of the same size. Through the development of efficiency, the farmer creates for himself a marketing problem and for his family an unemployment problem. This seems like a penalty on progress, and the anomalous outcome of farm improvements in creating farm difficulties impresses the corn belt as inscrutable. Urban industry, however, has gone through the corresponding experience often

enough to have become familiar with it. Probably, the problem of so-called technological unemployment has never been more acute than at present. Certainly it is as conspicuous and significant in agriculture as in industry.

Since we do not regard a remunerative market for the increasing outturn of agriculture as available naturally, or to be secured artificially, contraction of the agricultural plant is indicated. This contraction includes two parts: abandonment of submarginal land and consolidation of existing farms into larger farms, with migration of the corresponding farm population.

It is not clear how much submarginal land in the corn belt has been abandoned since 1921 and how much is still held in occupation and use. Probably, the fifteenth decennial census yields information on this point. In any event, we take it that a certain acreage in the corn belt is submarginal at current and prospective price levels of agricultural products, at current costs and taxes, and even without interest on investment. Those who have acquired these lands through foreclosure and abandonment will endeavor to bring them back into operation. If immigrants accustomed to low standards of living were available, these efforts would succeed. Otherwise, the prospect of reoccupation of obviously submarginal land is faint and deferred. Later, when efficiencies in operation have still further reduced costs, some of these lands may be gradually brought back into use. Abandonment and foreclosure of submarginal land has regrettable social consequences. But the adjustment of supply to demand will hardly be solved in the corn belt by the elimination of submarginal land; the changes must go farther.¹

¹ For a thoughtful appraisal of the future of the corn belt, see G. S. Shepherd, *The Secular Movement of Corn Prices* (Iowa State College Agricultural Experiment Station Research Bulletin 140), June 1931. See also G. F. Warren, "A State Program of Agricultural Development," *Journal of Farm Economics*, July 1930, XII, 359-66, and J. A. Hopkins, Jr., "Interpretation of Farm Efficiency Factors," *Journal of Farm Economics*, July 1930, XII, 384-404.

, *CONSOLIDATION OF LARGER FARMS*

According to the Census of 1930, the average acreage in the Iowa farm was 158. A quarter-section is too small a farm for modern methods. The owner of so small a tract cannot install efficient machinery and equipment for raising corn and hogs. Co-operative purchase and neighborhood purchase and use of farm machinery has not been found satisfactory. If the farmer wishes to confine himself to methods adapted to a quarter-section, he eschews large types of machinery; but in doing so he sticks to high costs. If he wishes to lower costs and to increase returns through the employment of modern methods, he must have more land. He buys his neighbor's farm, probably the farm of a man who would rather retire than reform. On the small farm, the overhead is out of proportion to the capital investment and crop outturn.

Perhaps Iowa illustrates most strikingly the persistence of the small farm, despite expansion of the potential outturn per man. Table 34 contains the appropriate data for the last four decennial censuses and also the special census of agriculture for 1925.

The number of farms has declined but slightly, while the average area per farm has increased but slightly. The number of farms operated by owners and part owners has declined significantly, and the average size of these farms has also declined. The number of farms operated by managers and tenants has risen significantly, and the average size of these farms has also risen. The trend, of course, is not so simple as might be inferred from the figures, because the development of truck farms, poultry yards, dairies, and other specialized enterprises complicates the situation. But it is significant that the average size of farms operated by managers and tenants has increased, while that of farms worked by owners and part owners has not. And when one considers the prominence of corn

TABLE 34.—AMOUNT OF LAND IN FARMS AND NUMBER OF FARMS OPERATED BY OWNERS AND PART OWNERS AND BY MANAGERS AND TENANTS, IN IOWA, ACCORDING TO CENSUSES OF 1900, 1910, 1920, 1925, AND 1930*

	1900	1910	1920	1925	1930
Land in farms (acres).....	34,574,337	33,930,688	33,474,896	33,280,813	34,019,332
Number of farms.....	228,622	217,044	213,439	213,490	214,928
Number of farms operated by full owners and part owners.....	147,305	133,003	121,888	116,444	111,333
Number of farms operated by managers and tenants.....	81,317	84,041	91,551	97,046	103,595
Average size of farms (acres).....	151.2	156.3	156.8	155.9	158.3
Average size of farms operated by full owners and part owners (acres).....	152.4	152.0	148.1	146.8	147.7
Average size of farms operated by managers and tenants (acres).....	149.1	163.2	168.5	166.8	169.7

* Data from United States census reports.

and other cereal culture in Iowa, the data clearly indicate that the overhead of families is excessive and the use of modern mechanization is deficient, from the standpoint of efficient operation.

Either by coalescence, or by direct primary purchase, the large-type farm has come into being in the corn belt. The enlarged farm, not the chain farm, is best in the corn belt. The movement has scarcely more than begun. The family in the corn belt desirous of raising corn and hogs cheaply and efficiently needs at least a half-section of land. Indeed, some students of the modern trend believe a full section of land would be better, and in certain regions in the corn belt this is true. We envisage, therefore, a de-parcellation of the land, just the opposite of the parcellation of the land that has occurred in the countries of the Danube since the war. But, it is to be emphasized, this means not the incorporated farm, not the chain farm, but the large-sized family farm.¹ It is hardly to be believed that the present low price level of staples will persist; but at a somewhat higher price level larger family farms will be able to show a profit not possible for smaller farms.

The effect on labor requirement is obvious. The corn-belt farmer becomes more of a manager and less of a worker. With new methods applied to 320 acres, the Iowa farmer has less need for hired help and less need for the help of his sons than he used to have with pre-war methods on 160 acres. The technical improvements bring about a superfluity of operative forces. Some families leave, some hired men leave, and some sons of farmers leave. Only when the workers replaced by the machines leave the farm, do the machines become economically effective.

¹ Cf. W. E. Grimes, "Social and Economic Aspects of Large-Scale Farming in the Wheat-Belt," *Journal of Farm Economics*, January 1931, XIII, 21-26, and A. G. Black, "Social and Economic Aspects of Large-Scale Farming in the Corn-Belt," *ibid.*, pp. 146-54.

We regard a reduction in farm population in the corn belt, in consequence of the introduction of improved machine methods, as inevitable. The extent and the velocity of the movement no one can forecast. Whether these country folk will betake themselves to agriculture in other regions, or find employment in town or city, remains to be seen. Some of these withdrawing farmers will have merely retired a few years in advance of their time. In 1910 the number of farms in Iowa was 217,044; this declined in 1920 to 213,439; the number reported in 1925 was 213,490; in 1930 it was 214,928. Obviously, if Iowa farms are to be consolidated into larger units, the number of farmers in Iowa will decline, certainly to less than 200,000 within the next decade. The same inference may be drawn for Minnesota, Missouri, and the corn states east of Iowa, but not so certainly for the corn states lying west of it, since these states still have considerable amounts of range land to be divided.¹

¹The effect on so-called subsistence farming of consolidation of small holdings into larger units will be watched with interest. Despite the agitation for diversification (for self-sufficiency) on the farm, there is a sociological reaction against subsistence farming which is clearly evident in studies of rural life. Foodstuffs raised on the farm constitute a surprisingly large contribution to farm income when properly computed on the basis of retail selling prices in the neighboring village. Nevertheless, it is coming to be regarded as a passing practice. The younger generation has little interest in garden and orchard. To a large extent, the care of garden, orchard, poultry, and milk house has been the work of women and children. The movement for the introduction into the farm home of household conveniences and labor-saving appliances includes also the impulse to restrict the work of women and girls to the household. The more extensive the use of power machinery on the farm, the less will be the inclination of the male members of the family to occupy themselves in garden and orchard. The farmer prefers to sell cream instead of butter. He has animals slaughtered to provide meat for the farm, but there is little curing of meat. To an increasing extent, meats for farm use are being purchased instead of prepared on the place. Truck farms are springing up on which are being grown the fruits and vegetables appropriate to the soil and climate. For the rest, the farm population tends more and more to purchase fruits and vegetables shipped in from a distance or uses canned fruits and vegetables.

How far this movement (toward cash-crop instead of subsistence farming) is to extend is not clear, but the trend seems clear. A good illustration (and also an illustration of the operation of the so-called melting pot) is to be found in the children of European immigrants who revolt against peasant practices that were second nature to their parents.

MANAGEMENT AND PRACTICE ON ENLARGED FARMS

Using Iowa again as illustration for the corn belt and disregarding abandoned submarginal land, when the area in farms is consolidated into larger units, and modern methods of raising plants and animals are applied on the enlarged farms, with the population reduced to the indispensable basis of man power, the consequences thereby entailed will include the following: (1) further reduction in work animals; (2) reduction of breeding stocks of hogs, cattle, and sheep; (3) reduction in acreage of corn, oats, and barley; (4) reduction in hay land; (5) reduction in pasture land; and (6) increase in grass land devoted to recuperation of soil. With substantial reductions in the directions indicated, the land in farms in Iowa could still maintain the customary outturn in plant crops and animal products, with allowances for variations in yield. This is true of the other states in the corn belt.

Whenever, thereafter, a positive reduction in outturn of plant crops and animal products, in Iowa and in the other states of the corn belt, is found necessary in adjustment of supply to effective demand, this will involve a considerable contraction in acreage cultivated and in animals sent to market. In particular, the breeding of hogs would need to be curtailed, and acreage of corn adjusted to the pig crop. The co-ordination of these adjustments is of crucial importance. If, by management, the average corn crop of the country could be reduced to 2.5 billion bushels (by elimination of the high cost fraction) and the average number of hogs slaughtered reduced to 60 million (raised in large litters and finished in 6 months), the agriculture of the corn-and-hog belt and with it that of all animal husbandry would be stabilized on a relatively high level.

Those who feel strongly that the family farm must remain the unit of American agriculture find in the corn

belt a great deal to support their view. At least, future developments may be envisaged in such a manner as to support the view. Regarding the corn belt as essentially a feeding yard, with hogs, cattle, sheep, poultry, eggs, and dairy products as major crops, and grains sold for cash as incidental crops, corn-belt farmers find such a diversified agriculture eminently suited to family ownership and operation of the farm. It is the size of the family and of the farm and the objectives of animal husbandry which modify the argument. The principal product of the animal husbandry cannot be fat, and this applies to hogs as well as to baby beeves and lambs. The size of the farm must be large enough to permit the family to utilize low-cost methods of raising feedstuffs and finishing animals. The size of the family must correspond with the man-hour requirements of the size of the farm. With the size of the farm varying from a half-section to a full section, with field work of women and children eliminated, with the birth-rate on the farm approaching the birth-rate in the town, and the statistical farm family corresponding with the statistical urban family, the enlarged farm in the corn belt certainly lends itself to family operation; but obviously, if one regards the acreage as constant, the number of families thus farming in the corn belt will be substantially reduced from the present number.

ADJUSTMENT OF SUPPLY TO DEMAND

Adjustment of supply to demand in respect to corn and hogs includes three interrelated successive and sequential operations in the corn belt.¹

1. A program of controlled breeding of hogs for market.

¹“Looking into the more distant future, we don't like the outlook unless farm folks are prepared to cut production or congress is prepared to give us an equalization fee or export debenture plan.”—Editorial on “Corn Prices” in *Wallaces' Farmer*, March 15, 1930, p. 7.

2. Contraction of acreage planted to corn and small feed grains.

3. Expansion of grass land, not harvested or used for pasture, but devoted to recuperation of the soil.

CONTROLLED BREEDING OF HOGS FOR MARKET

Price studies on hogs have made clear the direct dependence of terminal prices in stockyards on the volume of receipts. If one will take the number of hogs slaughtered under federal inspection in the corn belt and the cities adjacent to it and compare this with the price of hogs over the same area, one will get the impression that there is a central point above which increased stockyard receipts have resulted in decreased price returns and below which decreased stockyard receipts have resulted in increased price returns. Before the war, apparently, an increasing supply of hogs was related to an increasing gross value, as in the case of wheat; but the post-war experiences point in the opposite direction. Quite certainly, since the war, when the gross value and the cost of production of hogs are contrasted with the supply, it will be found that beyond a certain point increasing production of hogs is attended with a loss.¹ This is all the more true if one combines corn and hogs.

It follows from this that it ought to be possible, year after year, to determine what number of hogs, to be delivered during the hog crop year to packing houses operating under federal inspection in the corn belt, would yield the most profitable return to producers. It would not be necessary to go outside of the corn belt. Supply would include receipts at no more than nine public stockyards—Chicago, Cincinnati, Indianapolis, East St. Louis, Kansas City, St. Joseph, Omaha, Sioux City, and South

¹ Cf. J. D. Black, *Agricultural Reform in the United States*, p. 126; also, G. M. Peterson, "The Relation of Annual Weather Surpluses to Net Farm Incomes," *The Annals*, March 1929, CXLII, 391-401. See above, chapter vi.

St. Paul. The price might be weighted for all markets or the Chicago price might be used as the base-line; experience would bring out the best yardstick. Hog prices in the hog-deficiency states are fixed by the corn belt; smaller terminal markets, small slaughter markets, and all rural marketing may be disregarded. It ought to be possible to establish a working rule which should indicate for live hogs *a year in advance* the relation of supply to cost and total farm value, with prospective gains and losses at different levels of receipts at terminal markets.

In fact, such a chart has already been projected by Ezekiel. It is a striking fact that, in 1923-24, 11.83 billion pounds of hogs (live weight) were slaughtered under federal inspection at an average cost to packers of \$7.58 per hundredweight, whereas, in 1925-26, 9.66 billion pounds of hogs (live weight) were slaughtered under federal inspection at an average cost to the packers of \$12.37 per hundredweight.¹ In view of the fact that the number of hogs in the country (with control of infectious diseases) varies with the intent of the producer class, and within limits can be contracted or expanded at will by control of breeding, it follows that producers in the corn belt can fix the hog price, within limits. Accepting domestic demand as a constant (or computing a demand curve), producers can set the price regarded as desirable and then adjust production so that it will be equated with demand at the price desired. In a peculiarly favorable manner, the commodity of hogs lends itself to this adjustment; rather paradoxically, the adjustment is facilitated by the perishability of the commodity. But in order to make the adjustment, the farmers in the corn belt must accept and follow a program, *and take their eyes off the corn price and the corn-hog ratio*. Moreover, farmers

¹ Cf. Mordecai Ezekiel, "A Statistical Examination of the Problem of Handling Annual Surpluses of Non-perishable Farm Products," *Journal of Farm Economics*, April 1929, XI, 204; also Chart 15, p. 263 above.

must seek a better balance between winter and summer slaughter.

That this view on the sound policy of production of hogs here enunciated does not represent an outside opinion, but has been drawn from within the circle of the agriculture concerned, is easily shown. As illustration may be cited the meeting held in Peoria in 1928 and called a "Conference on Hog Cycles."¹ The meeting was attended by representatives of national and state departments of agriculture, farmers' organizations, extension services, pure-stock breeders, co-operative shippers, the rural press, packing houses, and by prominent farmers engaged in commercial production of hogs. How to escape from hog cycles and to adjust production to demand comprised the general topic under discussion. The first steps were taken toward the organization of a "National Board on Swine Production Policy." A report on immediate policy was adopted, to be urged on producers in the hog belt. The recommendations included such restraint in hog breeding as would provide not over 45 million hogs for slaughter under federal inspection during the hog crop year November 1, 1929—October 31, 1930. Since the 1928 crop of corn was sufficient to finish more hogs during the year 1928-29 than could be absorbed at a satisfactory price, farmers were urged to restrain production for the year 1928-29 and not feed out the corn crop, but instead to store corn on farms into the next crop year. Finally, reduction in the acreage of corn to be planted in 1929 was urged and an adjustment of the increased carryover recommended. In the interest of stabilized hog production at the point of satisfactory prices, it was urged that over a period of a number of years corn acreage in the corn belt should be reduced by

¹For an account of the meeting see *Wallaces' Farmer*, September 21, 1928, p. 5. For an account of an earlier conference held in Ames, Iowa, see *Wallaces' Farmer*, June 15, 1928, p. 4.

10 per cent. In short, co-ordination of corn acreage and hog breeding and reduction of both were urged as the sole methods whereby better prices could be secured and injurious fluctuations avoided.¹

In our judgment, the conference on hog prices and cycles represented a most significant movement. The "National Board of Swine Production Policy" ought to be permanently established on a quasi-official basis. Participants should include representatives of the producer group, the co-operatives, the packing houses, and of the national and state departments of agriculture. The statistical procedures should be intrusted to a permanent committee drawn from the Bureau of Agricultural Economics of the United States Department of Agriculture and from the state agricultural colleges of the corn belt. The large farm organizations—such as the American Farm Bureau Federation, the National Grange, and the Farmers' Union—might well be represented. The meetings and transactions should be public. The conference should possess an organ through which the program adopted would be made a matter of public record. The short-term and long-term trends should be forecast. The survey of intentions to breed should be elaborated and co-ordinated with the program adopted. A year in advance, the corn belt should be advised of the top limit of hogs to be marketed for slaughter under federal inspection and also the number that would be expected to be marketed in the nine named principal markets.² On the basis of the swine census for that year, the approximate pro rata proportion of each state in the corn belt would be indicated. In each state of the corn belt it would then become the function of the farm organizations and co-

¹ For a report on the first meeting of the National Board of Swine Production Policy, held in Chicago on December 28-29, 1928, see *Wallaces' Farmer*, January 11, 1929, p. 6.

² The obviously proper course is to have all states pass meat inspection laws which are identical in effect with federal inspection.

operative associations, the state agricultural college, the extension service, the county agents, and the rural press to bring these recommendations home to every hog raiser. Each individual farmer should be urged to arrange his prospective breeding operations irrespective of his supply of corn, of the price of corn, and of the corn-hog ratio. This might lead to some shifting to cattle, but this would be of indirect benefit, since the acreage requirements of cattle are larger than those of hogs.

CONTRACTION OF CORN ACREAGE

We come now to the second step in the adjustment of supply to demand without which the first step would be futile. This is contraction of the supply of feedstuffs. Farmers cannot effectively be urged to limit animal husbandry when their granaries are full. In a particular year they might restrain breeding of hogs and carry corn over; once, but not regularly. A contraction of the supply of feedstuffs must be proportioned to the program of the supply of hogs. This entails contraction of the acreage planted to corn. It entails secondarily and essentially a limitation of the acreage planted to oats, barley, and also rye. The acreage program must be co-ordinated state by state. When the farmer in the corn belt is urged to find a substitute for corn, he is likely to arrive at the conclusion that the best substitute for corn is corn; but in any event, the objective of contraction of corn is defeated if contraction of corn acreage results in expansion of acreage planted to small grains. Diversification of the grain acreage will not help the corn belt. It would be both inexpedient and injudicious to set up a program of contraction of acreage of corn without checking the overflow into wheat, rye, oats, and barley. Prospective demand for rye, oats, and barley makes increase in acreage planted to these grains a direct incursion into losses. In short, reduction in corn acreage in the corn belt must represent

reduction in total acreage planted to cereals in the corn belt, by as much as the reduction in corn acreage and perhaps by more.

The extent to which the acreage of corn in the corn belt would need to be contracted in any year would depend upon the hog program and upon other demand for corn. The yardstick would be the price of cash corn and the carryover, and the objective would be the avoidance of such surplus of corn as would tend to stimulate breeding of hogs. The contraction might be 10 million acres. It would need to be recognized that the corn-deficiency states outside of the corn belt could not be counted on to adopt the policy and might indeed expand their corn acreage. The point of attack on the corn acreage would be the corn belt and the burden would lie on the corn belt, irrespective of the reactions in outside states. When one contrasts programs of acreage reduction of wheat, cotton, and corn, it seems clear that corn occupies a disadvantageous position, since contraction of acreage of wheat and cotton would tend to increase corn acreage more than contraction of acreage of corn would tend to increase wheat and cotton acreage.

If we apply the reduction of corn acreage suggested at the Peoria conference to oats and barley as well, the indication for reduction may be put in figures. During the five recent years, 1927-31, the average combined acreage of corn, oats, and barley in five corn-belt states (Ohio, Indiana, Illinois, Iowa, and Nebraska) was about 56 million acres. Ten per cent of this, 5.6 million acres, would be withdrawn from cereal cultivation and turned into grass land. Whatever further contraction of acreage of small grains might be decided upon would have the same outcome—transfer to grass land.

Views on farm relief with relation to producer's price have diverged on one fundamental point: Is it desirable to undertake artificially to raise the producer's price ini-

tially and thereafter to undertake to adjust production to demand? Or is it preferable initially to undertake to adjust production to demand and therefrom to secure sequentially the higher producer's price? If one believes that it is possible through co-operative action or leadership to adjust production to demand, it would be better to undertake adjustment first, rather than following artificial price-raising. If one does not believe that it is thus possible to adjust production to demand, then price-fixing makes no lasting appeal because it could not succeed except transitorily with uncontrolled production.

We have not suggested a contraction in the growing of corn and the raising of hogs to the plane of the domestic basis. Nothing in the suggested adjustment of supply to demand is comparable with the plowing up of every third row of cotton or the plowing under of every fifth acre of wheat. The solution is not so simple as that. In chapter iii we have given our reasons for the view that an exportable surplus of hog products will persist. The adjustment sought implies a limitation of the exportable surplus. There is a difference between being drawn upon to supply the internal needs of importing countries abroad, as determined by their own supplies and wants, and forcing exports in order to get them out of the country and relieve pressure on domestic prices. In a quite analogous sense there is a difference between manufacturing enough automobiles to meet the spontaneous orders of dealers, and making so many that dealers have to be compelled to accept them under forced contract. Continuation of export of hog products is inevitable and desirable, provided the volume is not excessive. In our view the desirable volume ought to be determinable in advance. Occasionally such a situation as we envisage occurs by accident. In the year 1926 the total estimated slaughter of swine in the United States was less than 66 million, of which less than 41 million were killed under federal inspection; the total

estimated production of pork and lard was over 10 billion pounds, of which 6.6 billion pounds were federally inspected. The exports in that year were considerably over a billion pounds. The weighted average farm price of hogs for the crop year ending October 31, 1926, was \$11.63 per hundred pounds. A continuation of this relatively high price would have been accompanied by reduced exports. We repeat that what is here suggested is not contraction to the basis of domestic demand, but contraction to such an extent as will permit the equation of supply to domestic and foreign demand, other things equal, in a higher price which can be approximately forecasted in advance.

EXPANSION OF GRASS LAND

To what purpose in the corn belt is land, to be withdrawn from corn and other grains, to be devoted? It must be put down to grass. As here used, "grass" is a broad term, including legumes and pasture grasses, that is, grasses appropriate to the locality. It is the use of the added grass land which is most important in the argument. The final point in the program is that the grass land resulting from the program of contraction of corn acreage is not to be harvested as pasture (except in dry years, when the pastures run the danger of being overgrazed) or as hay. It is to be devoted to recuperation of the soil. The crops are not to be used for animals but are to be classed as cover crops and plowed under. Pasture land and idle grass land would be rotated. The crop must be a soil crop, not a product crop. This implies an expanded use of fallowing in the corn belt. In earlier times the term "fallow" had a wider meaning than is current now. It seems to us it would be advantageous to include under fallowing more than letting land lie idle with cultivation to conserve moisture and destroy weeds, in particular to include the planting of cover crops to be plowed

under for restoration of fertility. Reforestation would also be included, according to circumstances.¹

This limitation of use is imperative if the total scheme is to be successful. If the added grass land were to be used for the production of milk and meat, this would merely transfer the surplus problem of the corn belt from one point to another. It is no solution of the corn-belt problem to produce 5 or 10 million less hogs and more milk to an equivalent extent. Milk production is at present fairly satisfactory because we are not a net exporter. If the corn belt were substantially to expand milk production,² compensatory to the contraction of corn and hogs, this would throw the country into the position of a net exporter, with demoralization of prices and reduction in net return. The argument for further active diversification cannot be soundly applied to the corn belt. Diversification would merely result in diversity of surplus, and would defeat its own objective. Diversification must include planned recuperation of the soil.

The item of grass land devoted to recuperation of the soil introduces a step forward in crop rotation. It is of course not new in technique; it is merely new in extent of application. In some parts of the corn belt corn is merely rotated with oats—two years of corn and one of oats. A more advanced practice has been to include a legume or hay crop in a three- or four-year scheme of rotation. Occasionally, the scheme of rotation covers five years, with two years of corn, one year of oats or barley (or even rye or wheat), and two years of a legume, hay, or pasture. Some farmers now occasionally use a legume cover crop and plow it under, a form of fallow that en-

¹ The first projected plan of reforestation of abandoned farm land is being worked out in New York state. Whatever the merits or demerits of the plan, it is at least a beginning.

² As a matter of experience, the milk produced incidentally by beef-cattle cows in the corn belt has constituted an injury to the specializing dairy regions during recent years.

riches the soil with humus and nitrogen and reduces weeds. The proposal here sketched would introduce this as current practice, throughout the corn belt, to the extent of possibly 15 or 20 million acres.

The commercial incentives for thus introducing grass land into the scheme of crop rotation in the corn belt are twofold. The near-view incentive would be the increase in farm prices of the various plant crops and animal products to be attained through adjustment of demand to supply. The long-term advantage would be progressive regeneration of the soil, later to find expression in increased yield without increase of cost. The difficulty would lie in securing the effective co-operation of the individual farmers.

In connection with the obvious need for appropriate forestation in the corn belt, it comes to mind that this might advantageously be combined to some extent with grass land devoted to recuperation of the soil. But this cannot be considered by farmers so long as the land planted to trees is taxed. Unless land devoted to forestation can stand untaxed, defined for the time being as land set apart from private use despite location within farms and title held by the farmer, there will be no significant development of forestation. Such land should be free of taxes, under the proviso that when the trees have matured to the extent of producing commercial timber, taxes should be again levied, not on the land but on the stumpage. This policy, which is coming to be recognized as inevitable for lumber areas, finds equal application in the corn belt, where hardwood trees might be planted extensively, in small lots from farm to farm, to provide hard woods years hence when hard woods will certainly be scarce.

Each of these projects depends on the others: they cannot be separated, and upon the sequential application of the three steps in the program would depend the

success of the whole. The fortunate part about such a program is that control of breeding of hogs is in the hands of the farmer, and this is the initial step. If control of acreage were primary and adaptation in animal husbandry secondary, the plan would sound less practicable. But since control of the number of animals is the primary step and control of acreage secondary, the plan is practicable. With growth in population, the plan would become easier with the course of time.

POTENTIAL EXPANSION OF DEMAND

Is it not possible that developments in agriculture will lower costs to such an extent as to improve prospects of export? When corn can be raised for 15 cents a bushel less than now, perhaps it will be exportable with profit. With other things equal and unchanged, this might be inferred; but other things will not continue equal and unchanged. Mechanization of agriculture is under way in other exporting countries. Newer countries have still the lure arising from the tradition of advancing land values. Finally, surplus-exporting countries with a low standard of living can meet lower American prices by still further depressing the standard of living. Suppose also that the hogs going to slaughter could be produced on 6 bushels of corn to the hundredweight. Would not this reduction of cost enable us to continue remuneratively to export products corresponding to 6-10 million hogs per year?

With respect to domestic demand, no signs are apparent to indicate the probability, scarcely even the possibility, of expansion. Our per capita consumption of all cereals has been declining and in particular our use of corn. There is no reason why this should be revived. Our consumption of all meats, and especially of hog products, is high. There is no reason to anticipate an increase in the per capita meat consumption in the country; also,

there is no reason to anticipate that the consumption of fresh and cured pork should expand at the expense of other meats. We have already expressed the view that the per capita consumption of hog fat may be expected to decline.¹ We see no possibility of bringing about any change in the direction of increased consumption of hog products through advertising or in any other way. In our view a likely outcome is that the rate of growth of population will barely compensate for the rate of declining per capita consumption of hog products. The question of foreign demand deserves a more detailed examination.

As we interpret the decline in export of American hog products before the war, this was reasonably attributed to rising American prices, lower prices in competing surplus countries, adaptation of products to consumers' tastes in the importing countries, and discriminations and import regulations which bore particularly on American exports. Now that animal husbandry has been practically restored in Europe (outside of Russia), it becomes clear that these factors have reappeared and we expect that their influence will tend to persist. Does this imply that we have resumed the declining trend of exports of hog products absolutely or relatively?

When one regards the increasing volume of federally inspected slaughter of hogs, the declining trend of exports becomes evident. But why should not a larger and continually expanding foreign market be found for American hog products? At home, producers look forward to an increased demand representing growth of population. Might it not be possible also to find abroad enlarging outlets for pork and lard, the end-products of the corn crop of the United States? Surely, in many foreign countries the consumption of hog products is below the level of natural desire. In other countries, hog

¹ Apparently meat consumption in 1931 at the low prevailing price has been about the same as it was in 1930 at a significantly higher price.

products are scarcely in evidence in the markets. In the mixed diet, pork protein is the equal of any protein, and the dietaries of many foreign countries are low in protein. Hog fat is the equal of any fat or oil in fuel value. In short, why is it not to be urged that in many countries nutrition could be improved by increased ingestion of hog products? Corn does not grow well in all countries, and hog raising is primitive in many countries; this ought to give the American products a certain advantage. Will not peace and prosperity in Europe favor an expanding demand for hog products? If we are losing out in the British market, to what other countries shall exporters turn? Does a large market for cured products in Europe outside of Great Britain seem for the time being out of the question? Does our trade in pork products with countries outside of Europe hold any promise of early or substantial enlargement?

If American bacon is not good enough for the fastidious British taste, it is still too good for the ruling taste of most other importing countries. Despite decline, our exports of hams to Great Britain remain large; and since the American ham occupies a particular niche in the British scheme of provisions, this trade may be expected to endure. It will be difficult to induce countries that now buy pickled pork at lower prices to buy cured bacon, hams, and shoulders at higher prices. At the same time exports of lard will hardly decline, in the near future, below the pre-war level, unless the Europeans take up the use of lard substitutes.

The volume of hog products moving in international trade does not emerge directly from supply and demand, from exporters' surpluses and importers' requirements, if it were possible to set them up for hog products. International commerce is not so simple as that. Other factors than supply and demand influence the movement of a commodity in our complex international trade, where the

invisible items are as important as the visible items in the international accounts. Import and export of gold, movement of investment capital, contraction and expansion of foreign short-time balances, rates of exchange, rediscount rates, maturation and refunding of foreign investments—these and other factors influence the purchasing capacity of an importing country and the selling facility of an exporting country. To these reservations must be added, for the subject in hand, the difficulty in forecasting hog production in any country.

The importations of foodstuffs by foreign countries depend on purchasing capacity, among other things. Other things being equal, one might expect European purchases of hog products to express about the same monetary sum annually, which would mean larger amounts at lower prices and smaller amounts at higher prices.¹ But if one contrasts exports with prices year after year, it becomes apparent that Europe does not always import proportionally more when prices are low and less when prices are high. Among the "other things being equal" is the European supply of hog products (cf. pp. 153 ff.). If European swine producers flood their own markets, European purchases of imported hog products can hardly be expected substantially to rise even with decrease in price. A glance at the curve of export demand on page 40 of *Factors Affecting the Price of Hogs* does not lend assurance.

If Europe (ex-Russia) were a unity, and if we possessed trustworthy reports on production of animal products, one could attempt to appraise the position of American hog products in Europe, quite as in the case of wheat. With employment and income constant, one might

¹ Cf. G. C. Haas and Mordecai Ezekiel, *Factors Affecting the Price of Hogs* (U.S. Department of Agriculture Bulletin 1440), November 1926, charts entitled "Hog Prices and Export Demand" (p. 40) and "Index of Foreign Demand" (p. 45).

be tempted to assume European pork and lard consumption to be fairly uniform, and the imports from the United States (and other countries) would thus be quantitatively supplemental to domestic production. But income and employment vary from country to country and from year to year; domestic pork and lard production vary from country to country and from year to year; and domestic production and importation of other meats and fats, competitive with hog products, vary from country to country and from year to year.

In reality, an approximate forecast of European imports of American hog products is not possible for lack of trustworthy data on European production. The situation is different with wheat, for which an approximate forecast of import requirements is readily possible. Our exports of hog products before the war did not indicate that Europe tended, so to speak, to secure a constant volume of hog products, or to spend on imported hog products a constant sum of money. Prices, of course, influenced takings, but other variables were influential. During 1889-99, the average price tended to decline and the volume of exports rose. Beginning in 1900 there were three years of rising average price, accompanied by decline of volume of exports. The period 1905-08 had a moderate average price, with a rather large volume of exports. Beginning with 1909, the average price again tended upward, accompanied by reduced volume of exports. The average volume of American exported hog products in 1894-95 to 1898-99 was 1,362 million pounds, at an average price of 7.0 cents; in 1909-10 to 1913-14 the average volume was 872 million pounds, at an average price of 11.7 cents.¹

The decline of European imports at low prices prevailing during recent years is at variance with the pre-war experiences of the trade and not in conformity with

¹ See Appendix Table VII.

expectations based on supply and demand. The fact, however, is susceptible of a simple explanation. During these years, European pork production has been progressively recovering, while beef and mutton have been freely available. In 1927 in Europe the slaughter of hogs was heavy. After European meat production has recovered and pork imports have declined to the pre-war level, it may again eventuate that imports will tend to rise with declining prices and decline with rising prices.

We shall do well to watch expansion in other surplus countries. Whenever farmers in any country raise corn, they have the same incentives as have American farmers for converting the corn into hogs. In the future, therefore, expansion in hog raising and development of export markets is to be expected on the part of producers in the Danube states, Russia, Argentina, and South Africa. Russia and the Danube states stand nearer to western Europe than does the United States; Argentina and South Africa are more distant. But with regular liner sailings of vessels equipped with refrigerated space, the distance of producers in the Southern Hemisphere may be compensated by lower production costs. It is the part of precaution to recognize that it lies within the agricultural capacity of other countries to produce hog products cheaply and that Europe may have particular commercial incentives to favor imports from other countries than the United States.¹

¹In the Russian program for agriculture is a plan for expansion of hog raising under state aid. In the event that large supplies appear, this development would have a direct effect on our exports of hog products to Europe, especially since European countries would find it to their advantage to make purchases from Russia in exchange for their goods. An indication of the trend of sentiment in the United Kingdom is to be found in the following excerpt from a *Report of a Joint Committee on Agricultural Policy*, formulated at a conference of representatives of the Central Chamber of Agriculture and the Research Committee of the Empire Economic Union (pp. 15-16):

"The pig industry offers exceptional scope for expansion, and steps should be taken at once in consultation with the industry to place it upon a sound practical basis. We do not feel that an immediate duty on bacon or ham could

When European pork imports are considered from the importer's standpoint, the experiences of the last few years seem to indicate that importing European countries turn first to exporting European countries, and after that to overseas countries. Also, it is not improbable that in the importing European countries a preference will in future be shown in favor of the export hog products of Canada and of the Southern Hemisphere. Empire preference for Dominion pork is not an impossibility.

The production of hogs in some European countries—for example, Great Britain and the Danube states—is inclined to be relatively even; but in other countries—for example, Denmark and Germany—wide fluctuations occur, as in this country.¹ There can, however, be little doubt that hog production in Europe is rising, and this in both importing and exporting countries. The heavy hog production of northern Europe in 1927 was in part a cyclical event, but a continuously heavy production of hogs must be reckoned with. If it is more profitable for farmers in our corn belt to sell their corn as hogs than as corn, it is also more profitable for landlords and peasants in Europe to sell animals than grain, even though

be advocated solely in the interests of British agriculture in view of the inadequacy of present supplies and equipment. If such a duty were proposed in the course of negotiations for Imperial trade, we should support it as likely to give a stimulus to British pig-breeding, a branch of agriculture in which production can be increased with great rapidity.

"The case for a duty on foreign lard is not, on present information, a strong one even from the Imperial point of view. It has, however, been suggested to us that there is a possibility of a considerable increase of the Canadian supply. In any case we would recommend a small duty per lb. on imitation lard which can largely be supplied from home resources."

¹ The statistics on hog production are unreliable in most European countries. "In general, therefore, it may be said that the knowledge of the exportable surplus of good quality maize from the Argentine and, much more important, the progress of the great maize crop of America, construed in the light of the probable internal demand in that country as evidenced by the number of hogs, are the influences which mainly affect pig production in the Northern Hemisphere." — Ministry of Agriculture and Fisheries, *Report on the Marketing of Pigs in England and Wales* (Economic Series No. 12), London, 1926, pp. 23-24.

additional supplies of feedstuffs must be imported to finish the animals.

In many regions (outside of the Americas and Europe) hog products (excepting lard and mess pork) are either more or less strange or something of a luxury. Only in countries in the stage of extraction of new lands, or with large pastoral ranges, are people accustomed to heavy protein rations. The scale of living throughout most of Europe is relatively low. As the standard of living improves, the diet will improve, in part through the addition of larger amounts of animal products. Whether this will mean predominatingly hog products or other animal products is another question. If increased demand develops for hog products, whether these would be purchased from us or from other exporting countries or raised at home is still another question. The proportion of protein in the hog products will have influence. The average Continental European diet (an arbitrary concept) is probably lower in animal products than before the war, and there is a natural desire to have the accustomed intake of flesh restored. Broadly viewed, over most of Europe, the demand for animal products is increasing in city and country. But in some countries this is not regarded as a minimum dietary right, toward which strenuous efforts will be directed, but rather as a desirable semi-luxury.

The idea that we might draw favorable attention to American pork products by advertising abroad is naïve. The hog is too old in history to provide novel material for advertising copy, and in any event this could hardly be attempted without curing American pork products to meet established foreign tastes in different countries. The countries of South America, with Latin populations, have a low pork consumption. Outside of countries whose market for animal products is limited either by purchasing capacity or by dietary custom, are many countries whose

pork consumption is almost nil. Strenuously to undertake a campaign of penetration into backward countries with American pork products is not seriously suggested. Nevertheless, the Central and South American markets have some possibilities.

Apart from other considerations, however, an export drive on hog products would tend to involve lard in a competitive offensive against vegetable oils the world over. Vegetable oils are among the chief exports of tropical countries, and the British Empire, Holland, Belgium, and France are deeply involved in the development of their colonies. It is to their advantage to promote throughout the world the consumption of vegetable oils as foodstuffs and as industrial raw materials and of the crushed residues of oil seeds as concentrated feedstuffs. Lard has not been able successfully to resist the commercial attack of vegetable lard substitutes in the United States; indeed, one of the reasons why we seek an enlarged foreign market for lard is because so many Americans prefer vegetable lard substitutes instead. The time may not be far off when manufacturers of vegetable lard substitutes abroad will undertake to develop the European markets with the same energy shown in the development of the American market. Also, they may elect to enter the markets of tropical countries. To a considerable extent, other cooking fats may be substituted for lard in northern Europe, and therefore the prices of margarine and of vegetable oils influence the price of lard there. Consumption of fat by industrial workers varies with prosperity in Europe more than in the United States. If lard substitutes were ever to obtain in northern Europe the vogue they have secured in the United States, the position of lard producers the world over would be precarious indeed. For the moment, manufacturers in Europe prefer to make margarine rather than lard substitute.

The export of lard since the war has been singularly

well maintained. In northern Europe lard is used for its flavor as well as for the qualities of a fat. Previously, American lard had not ranked high in Europe (due in part to the standardization imposed by American federal regulations on packing houses). Therefore, particular circumstances must have been operative to maintain the trade. A German expert has expressed to the writer the following explanation for the heavy European imports of lard: namely, that with a growing stock of younger animals and a certain shortage of feeds, hogs have been finished for meat on emergency rations. This situation of course cannot continue long. As against this, recent modifications in the regulations imposed on American packing houses by the Bureau of Animal Industry of the United States Department of Agriculture would seem to promise some improvement in our position. Packing houses are now permitted to refine lard as vegetable oils have long been refined; uniform and high-grade lards, which will acquire an independent status in Europe and be less subjected to renovation and blending in the importing countries, can be prepared in mass production. Further, lard is now being hydrogenated, with improvement in the uniformity and melting point of the product. The largest proportion of the current lard exports are a refined packing-house lard, presumably a refined prime steam lard. Under these circumstances, and despite expansion in swine husbandry in Europe, there are grounds for hoping that American exports of lard to Europe will be well maintained unless margarines are cheapened or lard substitutes developed in that continent.

On the whole, it seems necessary to infer that the prospect of substantial expansion of the lard market in Europe, and elsewhere, is not sufficiently encouraging to be regarded as a factor in hog production in the United States during the next decade. The same inference would seem to hold for hams, shoulders, and bacon. Our exports

of fresh hog carcasses may expand somewhat, but this can hardly be expected to represent a very important outlet. We shall do well if we maintain the present volume of exports.

It seems likely that for some time to come many countries of the world will make efforts to exclude the products of other countries. This is done, under political pressure, for the purpose of conserving social order and security. The exporting countries suffer unless they have very low costs. We must distinguish between exporting for profit and exporting to get rid of surplus. The former will take care of itself; the latter is always calling for political support. The deferred hope of a revival of export of agricultural staples from the United States, as a continuous outlet for the present or an increased or even a decreased farm population, implies a rate of growth of population outside of this country, an increase in the standard of living in backward countries, and a retardation of mechanization of agriculture outside of the United States, for all of which assuring indications do not exist. In short, prospects of enlargement of export of corn and hogs (and of most other agricultural staples) are not promising and cannot be counted on.

TENDENCIES MAKING FOR REDUCTION OF CORN ACREAGE

Two conspicuous internal factors which may perhaps be expected to operate in the direction of reduction of the corn acreage are the *corn borer* and the so-called *non-competitive crops*. These are important, but it is necessary, in the nature of the circumstances involved, that the menace of the corn borer and the attraction of non-competitive crops be not exaggerated. Let us consider the corn borer first, since the progress of the insect will involve non-competitive crops as well as corn.

The *corn borer*, introduced from abroad, was discovered in Massachusetts in 1917. It has crossed the Alle-

gheny Mountains along the line of Lake Erie; whether from New England and New York or from Ontario, where the parasite has also been active, is here immaterial. The infestation has been progressing westward and southward, and is apparently not to be checked at any line by a campaign of delimitation. On the contrary, it seems necessary to foresee the probability that within a few years it will be found operative over the entire corn belt. The failure of the campaign to check the westward march of the corn borer lies partly in the extent and difficulty of the work, but largely in the habits of the parasite, which adapt it to self-preservation under unfavorable circumstances. Unless some natural enemy or disease of the corn borer is discovered, apparently the parasite will have to be combated by methods aiming at repression rather than at extermination, as is the case with corn smut, corn rot, the corn ear worm, the corn root worm, chinch bugs, and other infestations to which corn is more or less exposed in different regions and under different climatic circumstances. Relief from another direction is, however, suggested by the preliminary announcement of a corn-borer-resistant variety of corn.

There is no purpose here in going into a discussion of the parasitic infestations of corn, including the corn borer.¹ It is, however, informative to indicate the extent to which the depredations of the corn borer might influence the acreage and the crop of corn. In Ontario in the earlier years of the invasion the corn borer enforced a heavy reduction in the acreage of corn with replacement by other cereals, a reduction in the yield of corn where the growing of the crop was persisted in, and an increase in the cost of raising the crop. But more latterly, success

¹ See *Agriculture Yearbook, 1927*, pp. 199-210; and D. J. Caffrey and L. H. Worthley, *A Progress Report on the Investigations of the European Corn Borer* (U.S. Department of Agriculture Department Bulletin 1476), February 1927; also, *Agriculture Yearbook, 1931*, pp. 58-59.

has attended the adaptations, and now corn raising has been practically restored in Ontario, though at some increase in cost per acre.

From the one point of view, since there is so much corn in our corn belt, it might be expected that the corn borer would find unprecedented scope for extension and multiplication, an outcome that is suggested by experience with other plant infestations. On the other hand, it is clear that the position of corn in Ontario was relatively of such lesser importance that farmers shifted early from corn to other grains on comparatively slight provocation. Also, it was easy to do this in Ontario, because the feeding of animals with small grains was well understood. The farmer in the corn belt not merely has a greater stake in his corn crop; he also has at his disposal more information on the corn borer and better methods of combating the insect.

The corn borer is to be combated on the individual farm, by destruction of carriers, by change in rotation of crops, increase in corn cut for ensilage instead of being allowed to ripen, elimination of "hogging down," and improved methods of treatment of the soil. Changes in rotation may include (under varying circumstances from area to area) replacement with small grain, introduction of legumes (such as soy beans), and sugar beets, enlargement of fodder crops, and extension of grass land. These possible shifts in rotation are foreseeable at the present time; the actual occurrence will be determined by the extent to which different alternatives contribute to the campaign against the corn borer. The net result may be reduction in acreage planted to corn and further reduction in acreage harvested as corn. To a considerable extent, the hand labor involved in preparing corn for ensilage has tended to discourage this otherwise advantageous use of the plant. Recent perfections of implements, however, have made it possible to cut, chop, and

transport green corn stalks so that ensilage can be made at a much lower cost, and with the avoidance of the disagreeable manual handling of the material.

The farmer fights the corn borer on his farm by a thorough cleaning up and burning of cornstalks, stubble, and weeds, and by plowing so deep as to bury infested materials and the roots and stump of the hill of corn to a depth fatal to the corn borer. The deeply plowed land must be later prepared for the next crop. Cleaning up the cornfield is, of course, a new expense, and without profit except for its influence on the insect; but deep plowing represents an advance in practice which will largely if not entirely pay for itself in the long run. The implements, of course, involve investment of fresh capital, but this is in the accustomed direction of progress, representing an extension of power farming. To the extent that schemes of rotation need to be altered, this will necessitate some change in feeding practices. These changes may well be in the direction of gain rather than loss, once the farmers become accustomed to them.

During the interval of such readjustment as may prove necessary, the number of farmers in the corn belt who are working near the limit of marginal operation may be enlarged. Farm expenses will tend to be increased, and this alone may transfer some farms from small net gain into small net loss. Fighting the corn borer will entail improvement in farm management, and some farmers whose level of management is already low will be unable to pay the costs. Also, some land may be found less adaptable to the enforced crop rotations, if necessary, than to extractive cash corn growing. Spread over the entire corn belt, the net result over a period of years will tend to be increase of costs. Finally, the corn borer may accelerate the merging of small farms into large farms.

At the present writing (autumn of 1931) it seems clear that the disturbances provoked by the corn borer and by

efforts at control appear much less ominous than was previously anticipated. The methods of clearing the corn-field of stalks and other carriers have been greatly improved, from the standpoint of both efficiency and costs. Deep plowing and some change in the schemes of rotation in different regions seem themselves so advantageous as to be practically worth introduction for their own sakes, and thus become positive procedures of the farmer instead of a mere defense against the corn borer. To some extent in some regions, cutting of the crop for ensilage may be expanded, and certainly the harvesting of the corn by hogging down will have to be abandoned in infected fields. Feed-lot feeding of hogs will replace hogging down the corn crop. All in all, it seems now clear that the net increase in the cost of raising corn in the corn belt will probably not be sufficient to occasion or enforce a substantial reduction of the corn acreage. Corn will remain the crop of preference over the small grains, in so far as choice is permitted in the established scheme of rotation. Probably the scheme of rotation may be slightly altered in the direction of a reduction of corn acreage. Whether such effects as eventuate will press more in the corn belt than on corn production outside of it remains to be observed. We take it that the best corn lands and the best farmers will be the least injured. The necessary control of the corn borer will provide an incentive for better farming methods. In short, the latest view of prospective agriculture in the corn belt with the corn borer seems today not to forecast any really significant reduction of the corn acreage in the corn belt.

The so-called *non-competitive crops* include the sugar beet, fiber plants, and the soy bean, the last really not non-competitive. The most prominent fiber plant under consideration is flax. In this country flax has been raised almost entirely for seed, not for fiber. The amount of linen fiber imported could readily be raised in this country and

a considerable proportion of the acreage would naturally fall in the corn belt. The hitherto insuperable difficulties are related to the labor requirements. The retting and scutching of flax are laborious and objectionable tasks, which in linen-producing countries are done largely by women.¹ No machines have ever been perfected to carry out these operations. Until this is done, there is no prospect in this country of introduction of fiber flax on a large scale. The same objection holds for all fiber crops outside of cotton, and under these circumstances the tendency for the substitution of fiber plants for corn will not eventuate in changes of consequence.

The soy bean is being recommended as a substitute for grain crops in the United States and in central Europe. It demands an intensive form of tillage, but can be handled with machines. The plant acts to fix atmospheric nitrogen and produces a large amount of protein per acre. The oil, due to its chemical composition, is classed among the semi-drying oils, and finds some use in paints; it has also numerous other industrial applications, as in the manufacture of soap. Soy bean oil is a cooking and table oil of inferior grade. The expressed seed forms an oil cake used as a concentrated feedstuff. From the oil cake a flour may be prepared, which is much higher in protein than the cereal flours and is being used in Europe to enrich cereal meals. The soy bean is highly important as a source of protein in the food supply of Asia; it has no standing as a protein in the United States. It is not an advantageous source of starch or flour in the American diet.² The oil possesses no advantages over cottonseed oil

¹ Not long ago, to illustrate reported experiments on revival of flax growing in the United Kingdom, an American newspaper published a photograph alleged to have been taken on an estate of the King showing a group of women carrying large bundles of flax on their heads. If the future of flax culture depends on arduous field work of women, it is doomed; and the same comment may be applied to the raising of sugar beets by women and children in North America.

² Unless we use the soy bean as Orientals do.

as a foodstuff. To raise soy beans instead of corn in the corn belt would mean producing vegetable oil to compete with lard. The soy bean cake, like the compressed residue of the cottonseed, is a protein concentrate that must be employed sparingly as a feedstuff, especially in the case of hogs, because it tends to produce a soft pork.¹ All in all, the known uses of the soy bean do not indicate that the crop would be more profitable than corn and obviously it cannot be called non-competitive in the market sense, though it may appear so in agricultural practice, since it means raising lard substitute instead of lard. The yield of soy beans is ordinarily about half that of corn; it contains, however, over 30 per cent of protein and nearly 20 per cent of oil.

The suggestion is frequently advanced (for, rather than in, the corn belt) that sugar beets might be planted on a large scale in replacement of grain. The suggestion sounds superficially alluring, since the sugar beet is popularly regarded as a non-competitive crop because we import so much sugar. From the technical standpoint of diversification, crop rotation, and soil regeneration, more sugar beets would constitute a valuable addition to the cultivated crops in the corn belt. However, the suggestion is impractical, because sugar beet culture of the present type can hardly be greatly expanded in the United States.

The raising of sugar beets involves an intensive type of agriculture and usually entails the use of chemical fertilizer. The plant is subject to several devastating diseases and is exposed to parasitic infestations; these (involving the seedling, the root, and the leaf) entail continuous efforts of defense and the losses incline to be heavy.

¹ As the growing of soy beans expands north of the thirty-fifth degree latitude, the soft-pork belt moves northward; but while it may be possible by special curing methods to make attractive the carcasses of swine fattened on peanuts, this is not true of the carcasses of swine fattened on soy beans.

Raising sugar beets is essentially a peasant occupation and in the United States is carried through largely by immigrants from Europe who have retained their peasant attributes or by migratory workers brought in from Mexico. The thinning of the plants and the first weeding are manual tasks of a tedious nature: in sugar beet fields the world over such work is usually done by women and children. The trimming of the beets, like the cutting of cane, is a manual operation. No implements exist at present for these tasks; the proportion of the labor cost in raising sugar beets that can at present be transferred to machines is low.

We do not believe the descendants of the immigrants now working in our sugar beet fields will be willing to continue the occupation. We do not believe Congress will continue to permit the colonization of alien migratory labor for sugar beet culture, while denying equally effective entry to other kinds of agricultural workers. Irrespective of the tariff on sugar, the sugar beet acreage may be expected to decline rather than expand, in conformity with the current sentiment in farm circles on hand labor. In short, expansion in sugar beet agriculture depends on invention of labor-saving machinery.

Finally, the acreage involved in any projected expansion of sugar beet cultivation is relatively small. According to present experience, about 700,000 acres are required to produce a million tons of beet sugar. If we endeavor to replace Cuban sugar, this would require something less than 2 million acres of sugar beets. If to the corn belt were allotted the proportion corresponding to comparative advantage, the area of land taken from the coarse grains would be insignificant. Even this, however, is outside of the range of possibility, since the raising in the United States (in addition to the present sugar beet production) of an amount of beet sugar corresponding to the present importations of cane sugar from Cuba

would require, as effective incentive, so high a sugar price as to be clearly out of the question.

All told, from the so-called non-competitive crops little is to be expected in the near future in the direction of substitution for corn.¹ On the other hand, increase in corn acreage outside of the corn belt may be in prospect. If the laws being proposed for compulsory contraction of cotton acreage are adopted and become effective, the acreage planted to feed crops will be expanded and animal husbandry will be correspondingly enlarged. Since most of the Southern states are hog-deficiency states, such an outcome would have a direct effect on Southern demand for hog products from the corn belt.

ANALOGIES AND CONTRASTS WITH INDUSTRY

It is a trite statement that production is controllable in industry and uncontrollable in agriculture.² Indeed, it is so trite that it seems often to be regarded as axiomatic.

¹ We find it appropriate to quote the following statement which we do not feel invalidates the proposition of expansion of soil crops advanced above (pp. 543-46):

"In the long run corn is raised where and when it can be produced to better advantage than other crops. Corn production, therefore, is not related merely to the price of corn or to the particular adaptability of certain types of soil or climate to the raising of corn, but is also dependent on the alternative possibilities offered by other uses of the soil. Areas in which corn has never been raised might easily be given over to corn production if the price of corn rose to a point where it offered greater returns than other crops. It is likewise true that the price of corn might fall or the prices of other crops might rise to the point where corn production would be greatly reduced by the present corn belt. This has been demonstrated on numerous occasions in the corn belt, when less corn has been raised for the reason that greater acreages have been planted to wheat and to oats in response to relatively better prices on the latter. It follows, therefore, that curtailment in the production of corn is not merely a corn belt problem but that it will come about when, and only when, the prices of other agricultural products, which may now be raised in places far remote from the corn belt, rise relatively to a point where corn production will be given up in their favor, or when those regions which now produce at a loss are finally abandoned."—From an address by F. L. Garlock, "What of the Corn Belt?" delivered before the Agricultural Group at the Fourteenth Annual Meeting of the Chamber of Commerce of the United States, in Washington, May 10-13, 1931.

² Cf. R. C. Engberg, *Industrial Prosperity and the Farmer* (New York, Macmillan, 1927).

In fact, no generic distinction exists. All forms of agriculture cannot be regarded as a unity, nor can all forms of manufacture be so regarded. Production is somewhat variable in all lines; control is also variable.

Variations in crops depend on climate and prevalence of plant and animal diseases. Control by the farmer depends on adjustment of operations in relationship to natural variations. Thus, a double variability is possible in agriculture. Control of factory outturn depends on plant capacity, sizes of operative units, availability of raw materials and their substitutes, conditions of capital and credit, concentration of ownership, supply of labor, value of brands and trade-marks, taxes, circumstances of competition between producers, and other factors. In so far as capital and labor may be said to be more mobile and controllable within a season than climate, industrial production is inherently more controllable than agricultural production. But apart from conspicuous exceptions, as a matter of experience, for human but effective reasons industrial production seems in practice not much more controllable than agricultural production. The stress laid on stocks and inventories by writers on the business cycle and the importance attached to inventories in appraisals of the state of current business indicate that factories do not adjust their outturn to demand but pile up inventories, seasonally and also irregularly, in response to various incentives and not in strict relation to demand. Banks have continually to control their manufacturing patrons. Certainly, the present business cycle has indicated how difficult is control of industrial production.

Contrasting the situation of cereals, cattle, sheep, and hogs, on the one hand, with that of manufactured goods, on the other, the circumstances are not crucially different. J. E. Edgerton, president of the National Association of Manufacturers, speaking of manufactured goods and addressing himself to the National Association of Manu-

facturers' on October 24, 1928, made the following remark in connection with the tendency of production to outrun demand which he termed "the general loss of balance between production and distribution":

Of practically all commodities which America can produce, it is producing regularly from fifteen to thirty per cent more than it has the capacity and power to consume and dispose of profitably in other available markets. This general excess of supply over demand is manifesting its obvious effects in multitudinous ways.¹

As a rule, factories cannot sharply adjust production to demand, partly because they manufacture both for immediate and deferred consumption but also for reasons of internal management. Every factory faces two questions: with what proportion of capacity operations would the largest net profit be secured? and with what proportion of capacity operations would the lowest net loss be sustained? Shut-down losses are often higher than losses on part-time operations, even though these contribute to the surplus of supply over demand and enlarge the inventory. The staffs of the office and the field and the skilled workers within the factory (to whom years of training have been given by the organization) cannot be arbitrarily discharged, both on consideration of equity applied to employees and on long-term considerations of management applied to capital. Adjustment of supply to demand since 1921 has not been accomplished with lumber, coal, petroleum, cotton textiles, woolen textiles, leather, and flour, to mention conspicuous examples. Copper² represents perhaps the best instance of successful

¹ Cf. also Victor S. Clark, *History of Manufactures in the United States* (New York, 1929), III, 353-58.

² According to reports of the American Bureau of Metal Statistics, world production of copper was 2.1 million tons in 1929 and 1.8 million tons in 1930; production in the United States declined from 1.1 million tons in 1929 to 0.8 million tons in 1930. But the low price of copper (below 7 cents) indicates that here also the control has been unavailing. Copper stocks in the United States stood in the fall of 1931 at the highest level on record, and apparently the visible consumption of the world is not over 40 per cent of the production capacity of the world's copper mines.

adjustment of supply to demand, outside of highly organized and modernly rationalized industries. To regard the automobile as illustration for all urban industry in the matter of adjustment of supply to demand is unwarranted. Even so, the production of automobiles has out-run effective demand.

Free competition, enjoyed and imposed, results in more or less continuous relative overproduction, meaning thereby an operative surplus currently in excess of the effective distributive and selling facilities of the industry. Manufacturers are believed to be more far-seeing than farmers; if so, they ought to be able to foresee price trends and presumable relations of supply and demand and thus concurrently, but independently and without agreement, to expand or contract production, as the case may be. But while factories find it as easy to expand as do farmers, they also find it as difficult, or undesirable, to contract. How often have farmers raising a certain crop been urged by their advisers, or agreed among themselves, to limit the acreage in the coming season? The desired effect fails because a large proportion of the farmers, convinced that the others will cut acreage, do not cut theirs and even increase it. Similarly, when restriction of supply is regarded in a certain line of business as desirable, a large proportion of the producers, especially those with relatively lower costs, will take just the opposite tack.

The common idea among farmers that in manufacturing operations the selling prices are directly and proportionately reflected in profits, and that profits are proportionately and directly reflected in manufacturing operations, is without foundation. The proportion of factories that operate without profit is surprisingly large. In fact, if manufacturers had not been willing during the past eight years to use more raw materials than they could sell finished at a profit, farm prices would have

been a great deal worse than they have been. The idea that, because the spread between the raw prices and prices of finished goods at retail has been wide, manufacturing operations have been correspondingly profitable is far from the truth. If one takes out of the picture the conspicuous industries in which effective rationalization has been accomplished in the manufacture of articles newly designed and incorporating highly desired attributes (the automobile, the radio, and household electrical appliances), it is clear that manufacturers have during recent years not profited conspicuously as contrasted with farmers, in so far as the factor of adjustment to supply is concerned. Bankers find themselves continuously forced to put pressure on manufacturers to restrict their inventories. Certainly, profitless factories are as conspicuous in 1931 as profitless farms.

A hesitant attitude is displayed by many farm leaders in relation to the influence of supply on price of manufactured goods and farm products, respectively. Declaring that curtailment of supply elevates prices of manufactured goods, they are reluctant to say this for farm products, largely for the reason that curtailment of farm production seems difficult. Apparently, a remedy is ineffective if and because it is hard to apply. In the background, however, stands another confusion, revolving about the nature of the demand for foodstuffs.

The need for food is imperative up to a certain point, but beyond that point the need does not press. To use arbitrary figures for illustration, we must have 2,800 calories per day but have no use for anything over 3,000. The demand is inelastic. The need for food is characterized by a physiological point of saturation that sets foodstuffs apart from most other goods and services. Gratification of food want is limited by physiological requirement; gratification of most other wants is limited only by considerations of income. Translating physiology

into economics, this implies that demand for foodstuffs is very inelastic up to a certain point, beyond which it becomes very elastic. When the price level of foodstuffs rises, minimum requirements must be covered irrespective of price, though adaptations will be made by shifting from dearer to cheaper foods. When the price level of foodstuffs falls, more than maximum requirements will not be taken, no matter how cheap, though shifts will be made from cheaper to dearer foods. The national intake of food, in terms of calories, would be little greater if, with national income maintained, foodstuffs cost only half as much; the national intake of food, in terms of calories, would be little reduced if, with national income maintained, foodstuffs cost twice as much. Consumers would make numerous and extensive adaptations and substitutions between foodstuffs, but the net change in terms of calories would be small. The response of consumers to change in price is narrow for foodstuffs as a class and much wider for other goods and services.

These circumstances are inherently disadvantageous to agriculture, especially to an overextended agriculture in a period of contracting per capita food requirements. Because agriculture feels the full force of the dictum that curtailment of production is necessary to increase prices, farm leaders shrink from applying the injunction. In industry, where curtailment of production is perhaps no less often necessary, it seems relatively easy; in agriculture, where curtailment of production is often indicated, it seems relatively difficult.

Broadly considered, the farmer does not operate under an inexorable compulsion to produce a surplus based on climate; he operates on the basis of the age-old technical injunction (immortalized in English by Dean Swift) to make two blades grow where one blade grew before. Unfortunately, over the short term he does this to a considerable extent irrespective of cost and of price. The

crisis in agriculture demands an abridgment of this doctrine. So far as corn and hogs are concerned, this qualification lies to a large extent in the hands of producers. That it is hard to get farmers together by agreement is not to be disputed; but it ought not to be impossible to get them together in a common conviction as to their mutual interests.¹

CONSEQUENCES OF CONTRACTION

Before the war, the limitation of the agricultural area of the United States was a subject of popular concern. It was deplored that the supply of homestead land was approaching exhaustion, that the public range, unless conserved, would be depleted by overgrazing and ruined by erosion. Reclamation projects were established to satisfy putative land hunger and assumed demand for foodstuffs.² In short, we lived in an atmosphere of traditional apprehension concerning the capacity of our agricultural area.

Researches on utilization of the land and developments in agricultural technique since the war have reversed the position. It is now clear that we have available for cultivation more land than the amount necessary to sustain our population. The future program of utilization of the land will be concerned not with expansion but with contraction, less with volumes than with practices and costs. The question is not how the outturn of our agricultural area can be increased to cover the subsistence needs of the population. The problem is to determine

¹ "When we secure a new stability in the farm group through reducing farm products to our home needs, so that the remaining farmers can secure incomes equal to those now enjoyed by our industrial workers, we shall transform this portion of our home market, now consisting of many millions of people with low purchasing power, into a market with high purchasing power."—W. B. Donham, *Business Adrift* (New York, McGraw-Hill Book Company, 1931), p. 148.

² In fact, the objective was largely desire for increased rate of growth of population in the Western states, bringing increase in local purchasing capacity.

how minimum a portion of our agricultural area can be utilized to cover the subsistence needs of the population effectively in the nutritional sense, economically from the commercial standpoint of the consumer, and remuneratively from the commercial standpoint of the producer. The problem of the utilization of the agricultural area, in short, is not the problem of volume but of profit. For the white world as a whole, pressure of population on food supply has been replaced by pressure of food supply on population.

The improvements in agricultural technique, the adjustment of supply to demand, the contraction of acreage, and the consolidation into larger farms imply a contraction of farm population. Without question (and without evasion), the restriction of the agricultural class to the level of the strictly commercial interest of the class implies a contraction of the farm population relative to the total population. For the censuses of 1900 and 1910 we possess only an arbitrary separation of the total population into urban and rural, with the dividing line the town of 2,500 inhabitants. In 1900, rural population, thus defined, was 60.0 per cent of the total; in 1910 it had declined to 54.2 per cent. With the census of 1920 better information became available. In 1920, 29.9 per cent of the total population was classified as "farm population"; in 1930, the figure for farm population was reduced to 24.8 per cent of the total. If one assumes that in 1950 the total population will be about 140 million and the farm population 25 million, the proportion of the population engaged in farming would be only around 18 per cent.¹

¹ "There were about 80,000 fewer children born in the United States in 1929 than in 1928, about 60,000 less in 1928 than in 1927. The birth rate has fallen from 24.3 in 1921 to 18.9 last year. If this decline continues for four years more the number of births will be sufficient to maintain permanently only the present population of the United States, whereas the nation will have by 1960 certainly 150 million people and possibly 160 million. This continued increase in population is owing to the large number of young people resulting from higher birth rates in the past, few of whom will die in the next 30 or 40

The farm population gainfully occupied in farming has really been lower than the estimates. With declining proportion of the total population, the social importance and political influence of the class is reduced, though not in direct concordance with the numerical relation. If we assume that the country sixty years hence will have a stationary population of 160 million, with a not too optimistic appraisal of improvements in agriculture it is not unreasonable to assume that the farm population necessary to provide the food supply of the country (disregarding tropical products, of course) need not be over 25 million, or 16 per cent. If a larger farm population is to find gainful employment, their occupation must be based on exports. If in the national interest a larger farm population is desirable than is needed to cover the food requirements of our population, it must be supported by subsidy.

Adjustment of production to demand in the corn belt implies contraction of submarginal operation; conversely, the contraction of submarginal operation would effectuate a reduction in the surplus. The modern rationalization of manufacture, whatever the line, involves a contraction of submarginal manufacture. Rationalization of distribution involves a contraction of submarginal wholesaling and retailing. Rationalization of utilization of subsoil and forest resources involves elimination of submarginal operation in lumbering, coal mining, and petroleum exploitation. In all of these lines, discontinuance of submarginal operation will create disuse of plants and unemployment of persons. Therefore, it does not bring up a peculiar problem when one inquires what is to be-

years. The prospect is for a declining population after 1970, unless the immigration laws are modified."—O. E. Baker, "The Outlook for Land Utilization in the United States," *Journal of Farm Economics*, April 1931, XIII, 220-21. The fertility rates have been much higher for rural than for urban women, but the distinction is lessening. This relative decline in the fertility rate of rural women, together with the relative decline in rural population, presages a distinctly lower rate of growth of population.

come of the farmers displaced by abandonment of submarginal operation and consolidation of small into larger farms. Nor are the changes to be resisted until the future disposition of the displaced farmers is worked out; historical experience with technological unemployment is clear on this point.

The drift from farm to town has had many causes. Some have left the country because they have done well, others because they have not done well. Many farmers retired on what they regarded as a competency, and the number who so retired is perhaps indicated by the number of tenants who are descendants, or connections, of retired farmers. During recent years, a considerable number of those leaving farms were those who, almost without experience or capital, were attracted to farming between 1915 and 1920. Many of those who have abandoned farming left good land taken up at inflated prices; others deserted submarginal land opened up in a period of promotion. Some good farmers have left good farms because the efforts were out of proportion to the returns. To a considerable extent, explanation of the drift from country to town must be sought in the fact that with each year the per capita productivity of the farmer increases and thus the number of farm workers needed declines.

It is often pointed out on behalf of agriculture that restriction of immigration has elevated the wage level for both urban and rural workers, and by retarding the rate of growth of population has operated to curtail the domestic market for farm products. But recognition of the injury thus done to agriculture does not indicate a rule of action to the contrary. It would do agriculture no good to have restrictions on immigration lifted. That would simply result in flooding the country with immigrants accustomed to a low standard of living. The spokesmen for agriculture declare that peasantry must not be established in this country. Free immigration

would tend to accomplish exactly that; the only hope of maintaining a high standard of living on the American farm is to maintain restriction of immigration. This implies the continuation of drift from farm to town.

It is frankly to be recognized that the contraction of agriculture in the corn belt, of the type and to the extent indicated, bears some resemblance to an internal revolution. Among the impulses contributing to the settlement of the corn belt by immigration from Europe, land hunger was probably as prominent as political disaffection. With the land hunger of the European peasants, from which our immigrants were largely derived, was associated a certain immobility of occupation, in itself a resistant element in agriculture as in urban industry. To what extent unconscious land hunger (as distinguished from promotion and speculation) and occupational immobility remain in the present generation of farmers is conjectural. To what extent occupational satisfaction continues as a guiding incentive among farmers is likewise conjectural. To the extent that farmers in the corn belt have assimilated the current American doctrine of occupational adaptability and judge their farms strictly on commercial returns (both short-term and long-term), they will tend to co-operate in the internal revolution involved in acreage reduction and adjustment of supply to demand. Those who have a high sense of occupational satisfaction will be somewhat inclined to resist. The heaviest resistance will proceed from the vestiges of land hunger and occupational immobility which remain as the traditional heritage of agriculture of the subsistence type. But whatever the internal resistance, the objective, as well stated by E. G. Nourse,¹ is to make a new-time farmer out of the old-time farmer.

We meet here the sociological question of the balance

¹In a review of E. R. A. Selligman's book on *The Economics of Farm Relief* in *Journal of Political Economy*, February 1930, XXXVIII, 111.

between town and country. J. D. Black, one of our most distinguished leaders in agricultural policy, inclines to the view that the ratio of population of country and town ought to be influenced by other than strictly commercial considerations of the class, enforced by the slow operation of economic forces. Quotations from his book¹ are worth giving in this connection; though taken out of context, they present a terse statement of the case.

Any probable increase in the population of the United States could be provided with food and other farm products without taking another acre of land into farms and without any decline in the output per person or per unit of capital engaged in agriculture. (P. 488.)

Of course, there is another theory with respect to this whole matter of increase in acreage. Increase in exports of farm products may be looked upon as very much to be desired. If the country has become too industrial and too little agricultural during the past 20 years as a result of our subsidies to manufacturing, the positive method of rectifying this condition is to stimulate production. (P. 265.)

. . . . All our unprotected industries are undersized from the standpoint of best national economy. If export bounties will bring them back to their proper position, they should be given careful consideration. (P. 269.)

There is enough validity to the foregoing arguments to make a nation want to keep itself predominantly rural if it can be accomplished without much sacrifice of the financial well-being of either city people or country people. We can go so far as to say that some measure of pecuniary advantage should be sacrificed in favor of keeping a country rural to a considerable degree. In other words, a nation can afford even to burden the city industries a little and subsidize rural life. (P. 58.)

It follows from the above that the policy which a nation adopts with respect to its agriculture may have an important influence in determining its importance. (P. 49.)

¹ *Agricultural Reform in the United States*. Cf. also the chapter on "The Case of Agriculture" in W. H. Beveridge and others, *Tariffs: The Case Examined* (London, Longmans, Green and Company, 1931).

. . . . The objectives of national agricultural policy should, therefore, be: first, to hasten the improvement in the rural scale of living; second, to check the present rapid rate of migration to cities; and third, to maintain a somewhat larger proportion of our population on the land than otherwise would be the case. (P. 60.)

The nation needs to decide now whether it wishes its agriculture further to subsidize, relatively and even absolutely; whether it wants an increasing concentration of its people in urban areas and occupations. (P. 481.)

. . . . No one who gives the matter serious thought favors maintaining by subsidies a farm population much larger than can be justified by financial return. But there are reasons enough of a social nature—and even economic, in the true sense of that term—to warrant burdening the cities a little in order to maintain a larger farm population than we otherwise will have, and provide a better and fuller rural life. (P. 482.)

In short, a certain volume of agricultural occupation is desirable in the national interest on broad sociological grounds; but a part of it cannot be expected to be commercially profitable and therefore should be carried on subsidy at national expense. The country should support a certain amount of commercially remunerative agriculture in order to secure certain valuable, if intangible, returns. Where lies the predicated danger line of farm population and how agriculture can be planned remuneratively to employ a larger population are determinations not adduced.

There was considerable social outcry in 1920 when for the first time the urban population of the country exceeded the rural. In fact, the transition had little meaning because of the arbitrary definition of urban and rural. Much more significant is the situation developing within the rural population. In 1920, 20,047,377 persons were reported under rural-non-farm population, i.e., persons living in the country but not engaged in agriculture; 31,614,269 was the number reported as total farm population, i.e., persons living in the country and engaged in

agriculture. In 1930, the number reported as rural-non-farm population had risen to 23,662,710, whereas the number reported as total farm population had declined to 30,445,350. Under the influence of improved roads and automobiles, it is to be expected that the number of persons classed as rural population who are not engaged in agriculture will expand; at the same time, through continuing mechanization of agriculture and elimination of submarginal farming, the number of persons classed as rural population and engaged in agriculture will decline. It is a fair prediction that in 1940 the number of persons classed as rural population who are not engaged in agriculture will approach or exceed in numbers those who are engaged in agriculture. Put in another way, the rural non-farm population will equal or exceed the farm population.

Incidentally, this provokes inquiries on the social values of the rural population. To what extent are the sociological attributes of rural life dependent on the occupation of farming rather than on residence in the country? Assuming that the rural-non-farm population enjoys the same schools, highways, medical services, food supplies, cultural and recreational facilities, and household conveniences as are enjoyed by the farm population, may we expect that the rural-non-farm population will think politically as does the farm population and hold the same views toward social, agricultural, and urban developments? A. G. Black¹ has remarked that the "thinning out of the rural and village population will raise many social problems." But it strikes us that no serious problems need arise if it is not the rural population but merely the farm population which is reduced in numbers. The question demands thoughtful consideration, because in earlier studies of the value of rural life it has been more or less

¹ "Social and Economic Aspects of Large-Scale Farming in the Corn-Belt," *Journal of Farm Economics*, January 1931, XIII, 154.

assumed that the distinction lay between rural and urban living, and the rôle of the countryside as a place of living apart from occupation has not been fully appreciated until brought out by the recent census.

In the foregoing consideration of the corn belt we have dealt with the problem from the standpoint of the commercial interests of the producer class, without reference to the size of that class. If a farm population larger than that commercially justified by strictly economic forces were to be maintained, the corn belt would share rather heavily in the allotment. Without question a strong appeal lies in the sociological argument of balance between country and town. We fancy even "hard-boiled" economists would yield if there were any way to indicate the ratio most to be desired, if the methods of maintaining the farm population would really work, and if the rubric of population involved could be shown to have a considerable social importance.¹

But is it not probable that we have long ago passed the predicated ratio of farm population to total population? Broadly considered, 35 per cent looks low enough, but we slipped below that proportion some time ago. Shall we assume that 25 per cent is the indispensable, the lowest permissible, ratio and that our objective should be to recover that proportion? Shall we build up farm population or only stop migration from the farm? Shall we adopt a merely preventive policy and undertake in the national interest to prevent the farm population from declining below 20 per cent of the total population? Furthermore, wherein lies the promise for the larger farm population? It seems to us that expanding agricultural population by enlarging exportable surpluses is only possible through increase in the farm population by additional immigrants with a low standard of living. Other-

¹ Cf. Walter Burr, *Small Towns: An Estimate of Their Trade and Culture* (New York, MacMillan, 1929.)

wise, the agricultural disaffection will be merely continued on an expanded scale and over an extended area.

Finally, what would be the sociological or political importance of the rubric of population involved in the argument? Suppose, in execution of a policy based on the national interests, a minimum of 2 million or a maximum of 5 million additional people were kept on farms. Would this turn the scale in favor of rural influence? The question is answered by asking it. Howsoever we regret it, the situation is irreversible; the time is past. The current trends of urban and rural population are the consequences of the successive mechanization of urban industry and agriculture. We are passing into the second stage of the industrial revolution, broadly considered; whatever the dangers and defects, the movement is legislatively irreversible. The values of country life must be sought by the transferring of factories to the country; also, the country is the place where many people who work in cities may be more advantageously domiciled. The values sought for cannot be conserved by subsidizing a few million people to work on farms who might be more gainfully employed in other pursuits than agriculture.

The suggestion is made that if the country has become too industrial, as result of subsidies to manufacturing, the method of rectifying this condition is to stimulate farm production. The difficulty in this suggestion lies in the fact that stimulation of production will not rectify the condition complained of if many countries engage in it. But this is exactly the situation in the world. Every country in Europe is endeavoring to increase outturn of agricultural products in order to reduce dependence on imports and *to improve the position of agriculture*. Even Russia needs to expand production in order to pay for industrial imports and *to improve the position of agriculture*. Great Britain, France, and Italy support expansion of agriculture in Africa, in order to secure supplies

and to improve the position of colonial agriculture. Canada, Australia, and Argentina have the same motives for agricultural expansion that the United States had from the Civil War to the World War, and desire, in addition, to improve the position of agriculture. Manchuria and Mongolia invite a new frontier development of agriculture. Great Britain plans extensive long-term improvements in India in order to forestall famine when the monsoon fails, decrease imports and possibly increase exports, and to improve the position of agriculture. Is each country in the world, net importing and net exporting, to subsidize agriculture in the hope of maintaining the size, quality, influence, and affluence of the agricultural class? Let one expand the argument. Of the 1.8 billion people in the world, say 1.2 billion have been engaged in agriculture. With advancements in mechanization, transportation, and communications, how is it going to be possible on the land to find employment for such a proportion of the world's population?

It is not only in the United States that the balance between agriculture and industry is in question; it is more or less the subject of discussion everywhere except among backward peoples. Everywhere is advancement in mechanization—in manufacture, in transportation, in communications, in distribution, and in agriculture. In consequence of mechanization, of replacement of manual labor with machines, the per capita food requirement is declining. The productivity of agriculture in the world is such that outside of Asia, for the time being, the rate of growth of population is not keeping pace with the rate of growth of agriculture. Our best information is that world population is increasing at about 1 per cent per annum, while the outturn of agriculture is increasing at the rate of over 2 per cent per annum. For generations we may expect pressure of food supplies on population, not pressure of population on food supply.

No historical precedents exist which seem appropriately applicable to the United States. France is the occidental country which most of all has followed the long-term political tenet of maintaining the supremacy of the agricultural class. Her success has been due mostly to her geographical location, the characteristics of the peasant class, and the stationary population, aided indirectly by the fact that concentration of coal deposits across the Rhine and across the Channel gave Germany and the United Kingdom obvious advantages in industrialism which France did not dispute. It is declared that our country needs a strong agriculture but not a peasant class; but a large agriculture in terms of population cannot exist without a peasant class. We do not believe that our forecasts of the future trend of industry, agriculture, and population will be controverted. The divergence of views arises in respect to acceptance of the transition through internal adaptation or resistance by invoking external deterrents, by the addition of the equalization fee or the export debenture to our tariff system. If we judge agrarian reactions by historical examples at home and abroad, past and present, we must not be surprised if the American people venture to experiment with external methods before becoming reconciled to internal methods of adjustment. According to the Bureau of Agricultural Economics of the United States Department of Agriculture, in October 1931 the preliminary index number (on the basis of 1910-14 = 100) of prices received by farmers for farm products stood at 68, whereas the index number of retail prices paid by farmers stood at 126. Such a situation, even if transitory, is likely to provoke social reactions and political experimentation.

CONCLUSIONS

The internal methods of farm relief in the corn belt comprise technical improvements, a better utilization of

the area by a smaller farm population, and the adjustment of supply to demand. If the average farm in the corn belt were larger (at least a half-section and probably a full section), it would prove practicable to apply intensively the several mechanical improvements in the raising of corn. Breeding stock of hogs should be selected to bring the largest litters to market maturity in the shortest time; losses should be reduced by care and sanitation. The selected strains of hogs should be given efficient feeding. Through the combination of a number of demonstrated technical improvements, the outturn of market hogs per unit head of breeding stock and per unit of feed would be substantially augmented.

Farms are too small, the number of farmers too numerous, the gross income is divided between too many families. The answer is the larger family farm, not chain farming or incorporated farming. With the use of available modern implements, the outturn of corn and hogs per man may be greatly increased, probably doubled.

The adjustment of supply to demand implies contraction of corn acreage, restricted and controlled breeding of hogs, and the expansion of grass land in an improved rotation for the purpose of restoration of soil fertility. Relief through expansion of demand is not to be hoped for.

So-called non-competitive crops, such as sugar beets, soy beans, and flaxseed, offer little prospect for substitute gains. It is also to be fully comprehended that after cutting down the raising of corn and hogs the farmer cannot expand other cereals or cattle and sheep in substitution. The acreage placed into added grass land must be for restoration of soil fertility, not for cash or product income.

The common idea that generically agriculture cannot adjust production to demand and that urban industry does so effectively is a fiction. Adjustment occurs in all lines, in some more easily than in others, and the diffi-

culties are not consistently on the side of agriculture. The market for foodstuffs is much less elastic than for other goods and services, and this imposes on agriculture a particular obligation in the direction of adjustment of supply to demand.

The consequence of contraction of farm population in the corn belt would be a smaller proportion of farm population to total population. This consequence does not argue against the validity of a procedure imposed on economic grounds. To interpose an objection based on the intangible value of living on a farm in our complex social and political life has little point. The future rural population will be increasingly non-farming. The real problem is not the loss of farm population, but the absorbability of the dispensable farmers into urban industry.

The world is passing through a phase of economic nationalism. Most occidental countries and some oriental countries are trying to achieve self-containment. Self-sufficiency makes an alluring appeal. Never in the memory of living men has the doctrine of comparative advantage had so few political followers. Long-term advantage is lost in the mirage of short-term benefit. The ways and means employed to protect farmers in net-importing countries injure farmers in net-exporting countries and vice versa. Since national trade is measured in political as well as in economic units, the future course of international commerce is indeterminate. The place in the world of each country's natural surplus is obscured by the circumstance that under economic nationalism import demand does not represent the supplementing of domestic supply. The equation is for the time being political, and the demand curve for political goods cannot be charted. The problems of exporting countries, whether of capital, services, or goods, were never more distorted than now, and the outcome of this state of affairs is the situation called "international disequilibrium."

APPENDIXES

APPENDIX A

TABLE I.—TOTAL AND PER CAPITA CORN ACREAGE, CORN CROP, AND NUMBER OF HOGS IN THE UNITED STATES, 1880–1931*

Year	Population on January 1 (thou- sands)	Corn acreage		Corn crop		Hogs on farms and elsewhere, January 1	
		Total (thou- sands)	Per capita	Total (million bushels)	Per capita	Total (thou- sands)	Per capita
1880.....	49,511	62,369	1.26	1,823.2	36.8	51,200	1.03
1881.....	50,736	62,318	1.23	1,717.4	33.8	53,100	1.05
1882.....	51,906	64,262	1.24	1,194.9	23.0	62,900	1.21
1883.....	53,094	65,660	1.24	1,617.0	30.5	60,000	1.13
1884.....	54,302	68,302	1.26	1,551.1	28.6	59,600	1.10
1885.....	55,530	69,684	1.25	1,795.5	32.3	59,300	1.07
1886.....	56,776	73,130	1.29	1,936.2	34.1	58,900	1.04
1887.....	58,042	75,694	1.30	1,665.4	28.7	55,500	0.96
1888.....	59,327	72,393	1.22	1,456.2	24.5	53,600	0.90
1889.....	60,632	75,673	1.25	1,987.8	32.8	59,200	0.98
1890.....	62,118	72,088	1.16	1,998.6	32.2	59,100	0.95
1891.....	63,396	70,390	1.11	1,460.4	23.0	59,400	0.94
1892.....	64,465	74,496	1.16	2,055.8	31.9	62,900	0.98
1893.....	65,718	72,610	1.10	1,713.7	26.1	56,700	0.86
1894.....	66,990	74,434	1.11	1,707.6	25.5	57,000	0.85
1895.....	68,283	69,396	1.02	1,339.7	19.6	57,000	0.83
1896.....	69,594	85,567	1.23	2,311.0	33.2	56,600	0.81
1897.....	70,923	86,560	1.22	2,503.5	35.3	55,000	0.78
1898.....	72,270	88,127	1.22	2,144.6	29.7	55,100	0.76
1899.....	73,632	88,304	1.20	2,261.1	30.7	54,900	0.75
1900.....	75,156	94,914	1.26	2,454.6	32.7	54,418	0.72
1901.....	76,804	95,042	1.24	2,505.1	32.6	55,041	0.72
1902.....	78,422	94,636	1.21	1,613.5	20.6	48,419	0.62
1903.....	80,040	95,517	1.19	2,619.5	32.7	48,833	0.61
1904.....	81,658	90,661	1.11	2,346.9	28.7	51,213	0.63
1905.....	83,276	93,340	1.12	2,528.7	30.4	53,799	0.65
1906.....	84,894	93,573	1.10	2,748.9	32.4	56,489	0.67
1907.....	86,512	93,643	1.08	2,897.7	33.5	59,283	0.69
1908.....	88,130	94,971	1.08	2,512.1	28.5	63,421	0.72
1909.....	89,357	95,603	1.07	2,545.0	28.5	58,972	0.66
1910.....	91,530	98,383	1.07	2,572.3	28.1	50,588	0.55
1911.....	93,165	104,035	1.12	2,886.3	31.0	57,627	0.62

* Population data from National Bureau of Economic Research. Other data from *Agriculture Yearbooks*, 1927, pp. 774–75, and 1931, pp. 615 and 843; and *Crops and Markets*, September 1931, VIII, 348. Figures for corn crops and acre- ages are for the preceding fall; i.e., the data for 1880 are for the fall of 1879, etc.

TABLE I (Continued)

Year	Population on January 1 (thousands)	Corn acreage		Corn crop		Hogs on farms and elsewhere, January 1	
		Total (thousands)	Per capita	Total (million bushels)	Per capita	Total (thousands)	Per capita
1912.....	94,458	105,825	1.12	2,531.5	26.8	57,627	0.61
1913.....	96,144	107,083	1.11	3,124.7	32.5	55,868	0.58
1914.....	98,213	105,820	1.08	2,447.0	24.9	53,592	0.55
1915.....	99,710	103,435	1.04	2,672.8	26.8	58,972	0.59
1916.....	101,055	106,197	1.05	2,994.8	29.6	61,766	0.61
1917.....	102,590	105,296	1.03	2,566.9	25.0	58,662	0.57
1918.....	103,852	116,730	1.12	3,065.2	29.5	63,318	0.61
1919.....	104,524	104,467	1.00	2,502.7	23.9	66,007	0.63
1920.....	105,711	97,170	0.92	2,811.3	26.6	62,597	0.59
1921.....	107,412	101,699	0.95	3,208.6	29.9	61,180	0.57
1922.....	109,135	103,740	0.95	3,068.6	28.1	62,179	0.57
1923.....	110,688	102,846	0.93	2,906.0	26.3	72,082	0.65
1924.....	112,666	104,324	0.93	3,053.6	27.1	69,281	0.61
1925.....	114,293	100,863	0.88	2,309.4	20.2	58,013	0.51
1926.....	115,824	101,302	0.87	2,916.1	25.2	54,443	0.47
1927.....	117,297	99,615	0.85	2,691.5	22.9	57,199	0.49
1928.....	118,810	98,393	0.83	2,763.1	23.3	63,028	0.53
1929.....	120,500 ^a	100,673	0.84	2,818.9	23.4	59,821	0.50
1930.....	122,775 ^b	97,856	0.80	2,614.1	21.3	55,649	0.45
1931.....	124,500 ^a	101,413	0.81	2,093.6	16.8	54,734	0.44

^a Estimate of the Food Research Institute.^b Figure of the Bureau of the Census.

TABLE II.—ESTIMATED NUMBER OF HOGS IN THE UNITED STATES, HOG SLAUGHTER, RELATION OF SLAUGHTER TO TOTAL NUMBER OF HOGS, AND RELATION OF FEDERALLY INSPECTED SLAUGHTER TO TOTAL ESTIMATED SLAUGHTER, 1900-30*

Year	Total number of hogs in the United States on January 1 (thousands)	Hog slaughter (thousands)			Relation of hog slaughter to total number of hogs on January 1 (percentage)	Relation of federally inspected slaughter to total estimated slaughter (percentage)
		Total	Federally inspected	Other		
1900.....	54,418	50,470	23,990	26,480	92.7	47.5
1901.....	55,041	51,870	24,960	26,910	94.2	48.1
1902.....	48,419	48,260	23,535	24,725	99.7	48.8
1903.....	48,833	47,900	22,961	24,939	98.1	47.9
1904.....	51,213	49,987	24,726	25,261	97.6	49.5
1905.....	53,799	51,540	25,324	26,216	95.8	49.1
1906.....	56,489	52,680	26,649	26,031	93.3	50.6
1907.....	59,283	54,058	32,885	21,173	91.2	60.8
1908.....	63,421	60,515	38,643	21,872	95.4	63.9
1909.....	58,972	53,220	31,395	21,825	90.2	59.0
1910.....	50,588	47,076	26,014	21,062	93.1	55.3
1911.....	57,627	56,646	34,133	22,513	98.3	60.3
1912.....	57,627	55,564	33,053	22,511	96.4	59.5
1913.....	55,868	57,046	34,199	22,847	102.1	59.9
1914.....	53,592	55,501	32,532	22,969	103.6	58.6
1915.....	58,972	62,017	38,381	23,636	105.2	61.9
1916.....	61,766	67,613	43,084	24,529	109.5	63.7
1917.....	58,662	56,901	33,910	22,991	97.0	59.6
1918.....	63,318	64,796	41,214	23,582	102.3	63.6
1919.....	66,007	65,190	41,812	23,378	98.8	64.1
1920.....	62,597	61,890	38,019	23,871	98.9	61.4
1921.....	61,180	62,957	38,982	23,975	102.9	61.9
1922.....	62,179	68,105	43,114	24,991	109.5	63.3
1923.....	72,082	79,843	53,334	26,509	110.8	66.8
1924.....	69,281	79,631	52,873	26,758	114.9	66.4
1925.....	58,013	68,294	43,043	25,251	117.7	63.0
1926.....	54,443	65,779	40,636	25,143	120.8	61.8
1927.....	57,199	69,250	43,633	25,617	121.1	63.0
1928.....	63,028	76,593	49,795	26,798	121.5	65.0
1929.....	59,821	74,945	48,445	26,500	125.3	64.6
1930.....	55,649	70,390	44,266	26,124	126.5	62.9

* Data from *Agriculture Yearbook, 1931*, p. 843, and U.S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, p. 3.

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TABLE III.—NUMBER OF HOGS SLAUGHTERED UNDER FEDERAL INSPECTION, PRODUCTION OF PORK AND LARD UNDER FEDERAL INSPECTION, AVERAGE LIVE WEIGHT PER HOG, AND EXPORTS OF PORK AND LARD FROM THE UNITED STATES, 1900-30*

Year	Number of hogs slaughtered under federal inspection (thousands)	Production under federal inspection (million pounds)			Average live weight per hog at Chicago (pounds)	Exports of pork and lard (million pounds)
		Pork	Lard	Pork and lard		
1900.....	23,990	2,728	821	3,549	233	1,462
1901.....	24,960	2,752	829	3,581	227	1,471
1902.....	23,535	2,527	737	3,264	222	1,148
1903.....	22,961	2,543	766	3,309	228	1,110
1904.....	24,726	2,819	841	3,660	221	1,156
1905.....	25,324	2,739	799	3,538	223	1,392
1906.....	26,649	2,930	882	3,812	228	1,418
1907.....	32,885	3,763	1,137	4,900	332	1,209
1908.....	38,643	4,135	1,171	5,306	216	1,219
1909.....	31,395	3,545	886	4,431	218	947
1910.....	26,014	3,112	792	3,904	235	706
1911.....	34,133	3,977	1,010	4,987	229	1,080
1912.....	33,053	3,802	965	4,767	227	1,014
1913.....	34,199	3,958	1,006	4,964	229	1,049
1914.....	32,532	3,815	969	4,784	232	858
1915.....	38,381	4,253	1,081	5,334	223	1,407
1916.....	43,084	4,660	1,159	5,819	214	1,485
1917.....	33,910	3,650	926	4,576	216	1,329
1918.....	41,214	4,987	1,260	6,247	235	2,273
1919.....	41,812	4,991	1,323	6,314	235	2,667
1920.....	38,019	4,539	1,321	5,860	245	1,572
1921.....	38,982	4,730	1,379	6,109	241	1,662
1922.....	43,114	5,157	1,575	6,732	246	1,526
1923.....	53,334	6,351	1,971	8,322	244	2,035
1924.....	52,873	6,057	1,923	7,980	237	1,721
1925.....	43,043	5,235	1,452	6,687	236	1,268
1926.....	40,636	5,099	1,513	6,612	245	1,159
1927.....	43,633	5,495	1,557	7,052	240	1,033
1928.....	49,795	6,069	1,750	7,819	239	1,135
1929.....	48,445	5,911	1,763	7,674	241	1,245
1930.....	44,266	5,400	1,521	6,921	237	988

* Data from *Agriculture Yearbooks*, 1924, p. 909, and 1931, p. 847; and U.S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, pp. 3, 8, and 9.

TABLE IV.—PER CAPITA CONSUMPTION OF DRESSED MEAT AND OF PORK AND LARD IN THE UNITED STATES, 1900-30*

(Pounds)

Year	Total dressed meat (including pork and lard)	Pork	Lard	Total pork and lard
1900.....	156.0	64.7	13.2	77.9
1901.....	155.7	63.0	12.9	75.9
1902.....	149.4	57.8	11.7	69.5
1903.....	159.0	59.3	11.8	71.1
1904.....	160.7	62.8	12.4	75.2
1905.....	153.7	58.8	10.0	68.8
1906.....	155.4	59.7	11.2	70.9
1907.....	168.6	64.4	13.5	77.9
1908.....	163.8	66.1	13.5	79.6
1909.....	160.7	60.1	11.5	71.6
1910.....	153.0	57.1	11.4	68.5
1911.....	157.8	64.5	11.3	75.8
1912.....	148.6	61.8	11.2	73.0
1913.....	147.7	63.0	11.4	74.4
1914.....	145.2	62.3	12.2	74.5
1915.....	137.7	59.5	12.9	72.4
1916.....	141.3	60.1	13.6	73.7
1917.....	131.8	49.3	11.7	61.0
1918.....	143.4	54.8	13.3	68.1
1919.....	142.3	54.8	12.3	67.1
1920.....	150.1	60.5	13.3	73.8
1921.....	144.6	63.5	11.3	74.8
1922.....	153.0	66.1	14.2	80.3
1923.....	164.3	74.7	15.3	90.0
1924.....	165.1	74.7	15.4	90.1
1925.....	156.9	67.6	13.2	80.8
1926.....	156.5	65.7	13.5	79.2
1927.....	153.5	68.5	13.8	82.3
1928.....	152.7	73.9	14.7	88.6
1929.....	151.1	72.8	14.3	87.1
1930.....	145.5	68.2	13.8	82.0

* Data from U.S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, p. 10.

TABLE V.—NET EXPORTS OF CORN (INCLUDING MEAL IN TERMS OF GRAIN) OF PRINCIPAL CORN-EXPORTING COUNTRIES, AVERAGE OF 1909-14 AND ANNUALLY SINCE 1921-22*
(Thousand bushels)

Crop year July-June	United States	Argentina	Hungary	Roumania	Bulgaria	Jugo-Slavia	Russia	South Africa
Average 1909-14.....	36,968	115,747*	.....	46,634 ^b	9,190 ^c	.....	28,055 ^d	3,809 ^e
1921-22.....	179,365	112,553	(42)*	19,729	2,195*	12,394 ^c	.....	16,827
1922-23.....	96,458	122,875	(235)*	9,421	2,215*	451*	(3,168)*	7,109
1923-24.....	22,907	128,306	34	39,337	4,183 ^c	2,793 ^c	5,288	21,092 ^d
1924-25.....	5,174	158,624	3,180	24,619	5,624	37,713	6,836	6,969
1925-26.....	24,148	142,956	8,706	21,218	3,799	41,122	7,867	38,332
1926-27.....	18,721	272,454	2,194	59,037	5,365	14,496	8,170	276
1927-28.....	13,947	279,455	1,340	28,353 ^f	2,366	671	981	17,543
1928-29.....	41,384	243,424	(322)	3,854 ^f	2,000	534	.....	18,640
1929-30*.....	9,784	168,585	5,759	50,754 ^f	7,173 ^f	18,486	.....	18,309

* Data from *Agriculture Yearbooks* and publications of the International Institute of Agriculture. Figures in parentheses are net imports. Dots (...) indicate that data are not available.

^a Year ending December 31.

^b Three-year average.

^c Year ending July 31.

^d Eight months only.

^e Preliminary.

^f Estimate of International Institute of Agriculture for November-October year.

TABLE VI.—UNITED STATES CORN CROP, DOMESTIC EXPORTS, AND PERCENTAGE OF CROP EXPORTED, 1880-81 TO 1930-31*

Year July-June	Crop (million bushels)	Domestic exports ^a (million bushels)	Percent- age of crop ex- ported	Year July-June	Crop (million bushels)	Domestic exports ^a (million bushels)	Percent- age of crop ex- ported
1880-81.....	1,717.4	93.6	5.5	1905-06.....	2,748.9	119.9	4.4
1881-82.....	1,194.9	44.3	3.7	1906-07.....	2,897.7	86.4	3.0
1882-83.....	1,617.0	41.7	2.6	1907-08.....	2,512.1	55.1	2.2
1883-84.....	1,551.1	42.3	2.7	1908-09.....	2,545.0	37.7	1.5
1884-85.....	1,795.5	52.9	2.9	1909-10.....	2,572.3	38.1	1.5
Average..	1,575.2	55.0	3.5	Average..	2,655.2	67.4	2.5
1885-86.....	1,936.2	64.8	3.3	1910-11.....	2,886.3	65.6	2.3
1886-87.....	1,665.4	41.4	2.5	1911-12.....	2,531.5	41.8	1.7
1887-88.....	1,456.2	25.4	1.7	1912-13.....	3,124.7	50.8	1.6
1888-89.....	1,987.8	70.8	3.6	1913-14.....	2,447.0	10.7	0.4
1889-90.....	1,998.6	103.4	5.2	1914-15.....	2,672.8	50.7	1.9
Average..	1,808.8	61.2	3.3	Average..	2,732.5	43.9	1.6
1890-91.....	1,460.4	32.0	2.2	1915-16.....	2,994.8	39.9	1.3
1891-92.....	2,055.8	76.6	3.7	1916-17.....	2,566.9	66.8	2.6
1892-93.....	1,713.7	47.1	2.7	1917-18.....	3,065.2	49.1	1.6
1893-94.....	1,707.6	66.5	3.9	1918-19.....	2,502.7	23.0	0.9
1894-95.....	1,339.7	28.6	2.1	1919-20.....	2,811.3	16.7	0.6
Average..	1,655.4	50.2	2.9	Average..	2,788.2	39.1	1.4
1895-96.....	2,311.0	101.1	4.4	1920-21.....	3,208.6	70.9	2.2
1896-97.....	2,503.5	178.8	7.1	1921-22.....	3,068.6	179.5	5.8
1897-98.....	2,144.6	212.1	9.9	1922-23.....	2,906.0	96.6	3.3
1898-99.....	2,261.1	177.3	7.8	1923-24.....	3,053.6	23.1	0.8
1899-1900...	2,454.6	213.1	8.7	1924-25.....	2,309.4	9.8	0.4
Average..	2,335.0	176.5	7.6	Average..	2,909.2	76.0	2.5
1900-01.....	2,505.1	181.4	7.2	1925-26.....	2,916.1	24.8	0.9
1901-02.....	1,613.5	28.0	1.7	1926-27.....	2,691.5	19.8	0.7
1902-03.....	2,619.5	76.6	2.9	1927-28.....	2,763.1	19.4	0.7
1903-04.....	2,346.9	58.2	2.5	1928-29.....	2,818.9	41.9	1.5
1904-05.....	2,528.7	90.3	3.6	1929-30.....	2,614.1	10.3	0.4
Average..	2,322.7	86.9	3.6	Average..	2,760.7	23.2	0.8

* Data for crops and exports from *Agriculture Yearbooks*, 1927, p. 774, and 1931, p. 615; *Crops and Markets*, September 1931, VIII, 348; and *Monthly Summary of Foreign Commerce*. The data for 1930-31 are as follows: crop, 2,093.6 million bushels; domestic exports, 3.3 million bushels; percentage of crop exported, 0.2.

^a Including corn meal.

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TABLE VII.—QUANTITY, VALUE, AND PRICE PER POUND OF EXPORTS AND PICKLED PORK, AND LARD, ANNUALLY FROM

Year July-June	Hams, shoulders, and bacon			Salted and pickled pork		
	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)
1889-90.....	608,491	47,057	7.7	79,789	4,753	6.0
1890-91.....	599,086	45,651	7.6	81,317	4,787	5.9
1891-92.....	584,776	47,093	8.1	80,336	4,792	6.0
1892-93.....	473,936	45,715	9.6	52,460	4,117	7.8
1893-94.....	503,629	48,184	9.6	63,576	5,068	8.0
Average....	553,983	46,740	8.4	71,496	4,704	6.6
1894-95.....	558,044	48,737	8.7	58,267	4,138	7.1
1895-96.....	554,388	46,113	8.3	69,498	3,973	5.7
1896-97.....	665,646	50,157	7.5	66,769	3,297	4.9
1897-98.....	850,295	65,369	7.7	88,133	4,907	5.6
1898-99.....	788,498	62,331	7.9	137,197	7,917	5.8
Average....	683,374	54,542	8.0	83,973	4,846	5.8
1899-1900.....	708,568	59,392	8.4	133,200	8,244	6.2
1900-01.....	672,695	60,342	9.0	138,644	9,927	7.2
1901-02.....	610,804	60,673	9.9	115,896	10,118	8.7
1902-03.....	421,519	47,892	11.4	95,287	9,960	10.5
1903-04.....	444,615	46,741	10.5	112,225	9,527	8.5
Average....	571,640	55,008	9.6	119,051	9,555	8.0
1904-05.....	465,706	46,991	10.1	118,887	9,412	7.9
1905-06.....	555,479	55,922	10.1	141,821	11,682	8.2
1906-07.....	459,900	50,169	10.9	166,427	15,167	9.1
1907-08.....	462,959	50,648	10.9	149,506	13,333	8.9
1908-09.....	456,749	49,446	10.8	52,355	4,599	8.8
Average....	480,159	50,635	10.5	125,799	10,839	8.6
1909-10.....	299,048	36,218	12.1	40,032	4,422	11.0
1910-11.....	314,384	41,921	13.3	45,729	4,944	10.8
1911-12.....	412,618	49,890	12.1	56,321	5,349	9.5
1912-13.....	360,539	47,288	13.1	53,749	5,699	10.6
1913-14.....	359,846	49,646	13.8	45,543	4,897	10.8
Average....	349,287	44,993	12.9	48,275	5,062	10.5

* Data from *Statistical Abstract of the United States, Commerce and Navigation*. Prices per pound computed by Food Research Institute. The yearly totals in pork exports.

FROM THE UNITED STATES OF HAMPS, SHOULDERS, AND BACON, SALTED
1889-90 AND AVERAGES FOR FIVE-YEAR PERIODS*

Lard			Total		
Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)
471,084	33,456	7.1	1,159,364	85,266	7.4
498,344	34,414	6.9	1,178,747	84,852	7.2
460,046	33,202	7.2	1,125,158	85,087	7.6
365,694	34,644	9.5	892,090	84,476	9.5
447,567	40,090	9.0	1,014,772	93,342	9.2
448,547	35,161	7.8	1,074,026	86,605	8.1
474,895	36,822	7.8	1,091,206	89,697	8.2
509,534	33,590	6.6	1,133,420	83,676	7.4
568,316	29,126	5.1	1,300,731	82,580	6.3
709,344	39,711	5.6	1,647,772	109,987	6.7
711,260	42,208	5.9	1,636,955	112,456	6.9
594,670	36,291	6.1	1,362,017	95,679	7.0
661,814	41,939	6.3	1,503,582	109,575	7.3
611,358	46,560	7.6	1,422,697	116,829	8.2
556,840	52,376	9.4	1,283,540	123,167	9.6
490,756	50,855	10.4	1,007,562	108,707	10.8
561,303	46,348	8.3	1,118,143	102,616	9.2
576,414	47,616	8.3	1,267,105	112,179	8.9
610,239	47,243	7.7	1,194,832	103,646	8.7
741,517	60,132	8.1	1,438,817	127,736	8.9
627,560	57,498	9.2	1,253,887	122,834	9.8
603,414	54,790	9.1	1,215,879	118,771	9.8
528,723	52,713	10.0	1,037,827	106,758	10.3
622,290	54,475	8.8	1,228,248	115,949	9.4
362,928	43,301	11.9	702,008	83,941	12.0
476,108	52,509	11.0	836,221	99,374	11.9
532,256	52,090	9.8	1,001,195	107,329	10.7
519,025	58,187	11.2	933,313	111,174	11.9
481,458	54,403	11.3	886,847	108,946	12.3
474,355	52,098	11.0	871,917	102,153	11.7

gation of the United States, and Monthly Summary of Foreign Commerce.
this table are lower than those in Table 8 (p. 140) by the amount of the fresh

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TABLE VII

Year July-June	Hams, shoulders, and bacon			Salted and pickled pork		
	Quantity (<i>thousand pounds</i>)	Value (<i>thousand dollars</i>)	Average price per pound (<i>cents</i>)	Quantity (<i>thousand pounds</i>)	Value (<i>thousand dollars</i>)	Average price per pound (<i>cents</i>)
1914-15.....	550,419	76,376	13.9	45,656	4,911	10.8
1915-16.....	862,018	119,419	13.9	63,461	6,752	10.6
1916-17.....	933,809	166,796	17.9	46,993	6,941	14.8
1917-18.....	1,234,866	329,581	26.7	33,222	7,545	22.7
1918-19.....	1,905,487	582,872	30.6	31,504	7,444	23.6
Average....	1,097,320	255,009	23.2	44,167	6,719	15.2
1919-20.....	1,079,123	315,961	29.3	41,643	9,681	23.2
1920-21.....	661,310	143,204	21.7	33,286	5,381	16.2
1921-22.....	622,191	106,195	17.1	33,510	3,941	11.8
1922-23.....	727,603	114,258	15.7	40,934	4,953	12.1
1923-24.....	805,064	110,757	13.8	37,469	4,293	11.5
Average....	779,058	158,075	20.3	37,369	5,650	15.1
1924-25.....	528,477	90,751	17.2	26,726	3,666	13.7
1925-26.....	406,167	87,254	21.5	29,126	4,834	16.6
1926-27.....	271,225	57,428	21.2	27,962	4,389	15.7
1927-28.....	254,786	41,178	16.2	31,650	4,205	13.3
1928-29.....	254,644	45,747	18.0	39,906	5,944	14.9
Average....	343,060	64,472	18.8	31,074	4,608	14.8
1929-30.....	263,284	46,824	17.8	39,809	5,560	14.0
1930-31.....	152,161	25,519	16.8	21,118	2,652	12.6

(Continued)

Lard			Total		
Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)	Quantity (thousand pounds)	Value (thousand dollars)	Average price per pound (cents)
475,532	52,440	11.0	1,071,607	133,727	12.5
427,011	47,634	11.2	1,352,490	173,805	12.9
444,770	77,009	17.3	1,425,572	250,746	17.6
392,506	98,217	25.0	1,660,594	435,343	26.2
724,771	210,176	29.0	2,661,762	800,492	30.1
492,918	97,095	19.7	1,634,405	358,823	22.0
587,225	171,523	29.2	1,707,991	497,165	29.1
746,157	131,329	17.6	1,440,753	279,914	19.4
812,379	95,007	11.7	1,468,080	205,143	14.0
952,642	116,594	12.2	1,721,179	235,805	13.7
1,014,898	129,091	12.7	1,857,431	244,141	13.1
822,660	128,709	15.6	1,639,087	292,434	17.8
792,735	123,283	15.6	1,347,938	217,700	16.2
695,445	114,471	16.5	1,130,738	206,559	18.3
675,812	96,837	14.3	974,999	158,654	16.3
716,398	94,546	13.2	1,002,834	139,929	14.0
780,914	101,971	13.1	1,075,464	153,662	14.3
732,261	106,222	14.5	1,106,395	175,301	15.8
787,160	93,766	11.9	1,090,253	146,150	13.4
585,649	61,525	10.5	758,928	89,696	11.8

TABLE VIII.—EXPORTS OF VARIOUS PORK PRODUCTS FROM THE UNITED STATES, CLASSIFIED ACCORDING TO DESTINATIONS, WITH PERCENTAGES GOING TO THESE DESTINATIONS, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*

Year July-June	Total	United Kingdom	Other Europe	Ex- Europe	Total	United Kingdom	Other Europe	Ex- Europe
	(thousand pounds)				(percentage)			
HAMS AND SHOULDERS^a								
1909-10.....	146,885	130,303	5,786	10,796	100	88.7	3.9	7.4
1910-11.....	157,709	135,433	10,064	12,212	100	85.9	6.4	7.7
1911-12.....	204,044	169,675	16,827	17,542	100	83.2	8.2	8.6
1912-13.....	159,545	134,017	6,829	18,699	100	84.0	4.3	11.7
1913-14.....	165,882	146,007	4,710	15,165	100	88.0	2.8	9.2
Average..	166,813	143,087	8,843	14,883	100	86.0	5.1	8.9
1921-22.....	271,642	233,566	13,218	24,858	100	86.0	4.9	9.1
1922-23.....	319,269	259,353	21,317	38,599	100	81.2	6.7	12.1
1923-24.....	381,564	307,771	35,491	38,302	100	80.7	9.3	10.0
1924-25.....	292,214	241,150	19,776	31,288	100	82.5	6.8	10.7
1925-26.....	220,015	190,136	6,456	23,423	100	86.4	2.9	10.7
1926-27.....	143,649	124,391	1,875	17,383	100	86.6	1.3	12.1
1927-28.....	127,819	104,020	2,505	21,294	100	81.4	2.0	16.6
1928-29.....	125,395	100,960	3,023	21,412	100	80.5	2.4	17.1
1929-30.....	130,317	103,169	3,294	23,854	100	79.2	2.5	18.3
1930-31.....	99,857	81,294	1,699	16,864	100	81.4	1.7	16.9
Average..	211,174	174,581	10,865	25,728	100	82.6	4.0	13.4
BACON^b								
1909-10.....	152,163	133,995	6,185	11,983	100	88.1	4.1	7.9
1910-11.....	156,675	116,405	29,672	10,598	100	74.3	18.9	6.8
1911-12.....	208,574	147,449	49,506	11,619	100	70.7	23.7	5.6
1912-13.....	200,994	138,133	46,138	16,723	100	68.7	23.0	8.3
1913-14.....	193,964	132,820	34,097	27,047	100	68.5	17.6	13.9
Average..	182,474	133,760	33,120	15,594	100	74.0	17.5	8.5
1921-22.....	350,549	184,703	128,574	37,272	100	52.7	36.7	10.6
1922-23.....	408,334	188,274	182,482	37,578	100	46.1	44.7	9.2
1923-24.....	423,500	161,028	222,956	39,516	100	38.0	52.7	9.3
1924-25.....	231,261	128,605	68,727	33,929	100	55.6	29.7	14.7
1925-26.....	186,153	106,909	49,908	29,336	100	57.4	26.8	15.8
1926-27.....	127,543	68,220	30,341	28,982	100	53.5	23.8	22.7
1927-28.....	126,967	50,128	49,426	27,413	100	39.5	38.9	21.6
1928-29.....	129,249	53,364	49,871	26,014	100	41.3	38.6	20.1
1929-30.....	132,967	57,443	48,953	26,571	100	43.2	36.8	20.0
1930-31.....	53,412	26,203	8,670	18,539	100	49.1	16.2	34.7
Average..	216,994	102,488	83,991	30,515	100	47.6	34.5	17.9

* Data from *Statistics of Hogs, Pork, and Pork Products* (U.S. Department of Agriculture Statistical Bulletin No. 18), January 1927, pp. 90-92, supplemented by additional data furnished by the Department of Commerce.

^a Includes Wiltshire sides.

^b Includes Cumberland sides.

TABLE VIII (Continued)

Year July-June	Total	United Kingdom	Other Europe	Ex- Europe	Total	United Kingdom	Other Europe	Ex- Europe
	(thousand pounds)				(percentage)			
PICKLED PORK								
1909-10.....	40,032	8,679	2,266	29,087	100	21.7	5.7	72.6
1910-11.....	45,729	8,754	3,343	33,632	100	19.1	7.3	73.6
1911-12.....	56,321	13,501	2,092	40,728	100	24.0	3.7	72.3
1912-13.....	53,749	14,620	2,600	36,529	100	27.2	4.8	68.0
1913-14.....	45,543	5,572	1,929	38,042	100	12.2	4.2	83.5
Average..	48,275	10,225	2,446	35,604	100	20.8	5.1	74.0
1921-22.....	33,510	4,914	4,957	23,639	100	14.7	14.8	70.5
1922-23.....	40,934	5,853	7,274	27,807	100	14.3	17.8	67.9
1923-24.....	37,469	4,106	9,511	23,852	100	11.0	25.4	63.6
1924-25.....	26,726	3,281	2,131	21,314	100	12.3	8.0	79.7
1925-26.....	29,126	2,972	2,898	23,256	100	10.2	10.0	79.8
1926-27.....	27,962	3,857	944	23,161	100	13.8	3.4	82.8
1927-28.....	31,650	5,184	1,835	24,631	100	16.4	5.8	77.8
1928-29.....	39,906	7,607	2,638	29,661	100	19.1	6.6	74.3
1929-30.....	39,809	5,094	2,321	32,394	100	12.8	5.8	81.4
1930-31.....	21,118	2,945	781	17,392	100	13.9	3.7	82.4
Average..	32,821	4,581	3,529	24,711	100	13.9	10.1	76.0
LARD								
1909-10.....	362,928	161,331	136,719	64,878	100	44.4	37.7	17.9
1910-11.....	476,108	165,412	237,101	73,595	100	34.7	49.8	15.5
1911-12.....	532,256	186,125	258,958	87,173	100	35.0	48.6	16.4
1912-13.....	519,025	168,380	252,104	98,541	100	32.4	48.6	19.0
1913-14.....	481,458	164,633	221,084	95,741	100	34.2	45.9	19.9
Average..	474,355	169,176	221,193	83,986	100	36.1	46.1	17.7
1921-22.....	812,379	244,465	422,412	145,502	100	30.1	52.0	17.9
1922-23.....	952,642	241,144	515,053	196,445	100	25.3	54.1	20.6
1923-24.....	1,014,898	240,017	584,401	190,480	100	23.6	57.6	18.8
1924-25.....	792,735	223,011	400,864	168,860	100	28.1	50.6	21.3
1925-26.....	695,445	218,146	300,545	176,754	100	31.4	43.2	25.4
1926-27.....	675,812	222,086	267,290	186,436	100	32.9	39.5	27.6
1927-28.....	716,398	233,564	285,624	197,210	100	32.6	39.9	27.5
1928-29.....	780,914	229,899	325,798	225,217	100	29.4	41.7	28.9
1929-30.....	787,160	240,147	323,252	223,761	100	30.5	41.1	28.4
1930-31.....	585,650	256,330	163,997	165,323	100	43.8	28.0	28.2
Average..	781,403	234,881	358,924	187,599	100	30.8	44.8	24.4

600 *CORN AND HOG SURPLUS OF THE CORN BELT*TABLE IX.—EXPORTS AND RE-EXPORTS FROM THE UNITED KINGDOM
OF BACON, HAMS, AND LARD, 1921-30**(Thousand pounds)*

Year	Total bacon and hams		Bacon		Hams		Lard	
	Exports	Re-exports	Exports	Re-exports	Exports	Re-exports	Exports	Re-exports
1921....	1,384	61,505	775	59,135	609	2,370	650	3,799
1922....	2,210	7,363	1,056	4,391	1,154	2,972	625	959
1923....	4,889	42,803	3,113	36,853	1,776	5,950	1,039	2,202
1924....	5,026	65,548	3,177	58,671	1,850	6,877	1,167	1,622
1925....	4,894	56,870	2,994	52,809	1,900	4,061	1,268	2,287
1926....	4,450	51,707	2,765	48,926	1,685	2,781	932	2,699
1927....	5,308	46,384	3,686	43,602	1,622	2,782	878	968
1928....	5,297	41,798	3,573	39,134	1,724	2,664	959	1,572
1929....	4,908	41,893	3,300	39,275	1,608	2,618	524	867
1930*...	4,542	42,208	3,314	40,004	1,228	2,204	739	1,118

* Data from *Annual Statement of the Trade of the United Kingdom, 1923*, II, 409, 428, and III, 12, 25; *1927*, I, 62, 63, 101, 103; and *1929*, I, 51, 53, 85, 87. Data for 1930 furnished through the kindness of the Ministry of Agriculture and Fisheries.

* Preliminary.

TABLE X.—PRICES OF CORN AT CHICAGO AND LIVERPOOL, UNITED STATES EXPORTS OF CORN OVERSEAS, AND UNITED KINGDOM IMPORTS OF CORN FROM THE UNITED STATES AND ARGENTINA, MONTHLY, 1921-22 TO 1930-31*

Year and month	Chicago—weighted average cash sales price of No. 3 yellow (cents per bushel)	Liverpool—average spot price		United States exports of corn overseas (thousand bushels)	United Kingdom imports of corn	
		American mixed (cents per bushel)	Yellow La Plata (cents per bushel)		From United States (thousand bushels)	From Argentina (thousand bushels)
1921-22						
November ...	47	78	78	2,507	298	2,725
December ...	47	85	88	8,893	679	2,243
January	48	81	92	16,307	2,371	1,480
February ...	55	90	108	17,682	2,741	810
March	57	85	108	19,591	6,223	1,819
April	58	83	103	13,320	3,149	1,778
May	62	84	106	6,649	2,192	1,766
June	61	84	101	8,172	1,054	818
July	64	98	110	6,332	1,419	1,360
August	62	92	110	6,234	3,472	1,929
September ..	64	90	109	2,746	1,409	1,795
October	69	100	108	5,985	1,107	1,898
Average, or total	55*	88	102	114,418	26,114	20,421
1922-23						
November ...	71	100	96	5,681	2,359	5,013
December ...	73	100	100	3,456	1,996	5,211
January	70	99	99	6,013	1,959	6,541
February ...	72	100	104	7,902	1,220	4,843
March	73	100	105	6,373	2,497	2,462
April	79	106	109	4,397	1,727	652
May	82	107	114	2,626	2,178	285
June	84	109	110	1,100	540	1,377
July	88	95	102	643	404	2,729
August	88	116	94	145	224	5,971
September ..	89	116	98	37	43	3,251
October	104	n. q.	97	28	4	3,858
Average, or total	73*	104	102	38,401	15,151	42,193

* Data from U.S. Department of Agriculture, *Corn Statistics* (Statistical Bulletin No. 28), January 1930, p. 135; *Agriculture Yearbook, 1931*, pp. 626-27; *Crops and Markets*; *Monthly Summary of Foreign and Domestic Commerce*; and *Accounts Relating to Trade and Navigation of the United Kingdom*. Data for 1930-31 supplied through the kindness of the U.S. Departments of Agriculture and Commerce. No quotation is indicated by n. q. Exports of less than 500 bushels indicated by "x."

* Average of daily prices weighted by car-lot sales.

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TABLE X (Continued)

Year and month	Chicago—weighted average cash sales price of No. 3 yellow (cents per bushel)	Liverpool—average spot price		United States exports of corn overseas (thousand bushels)	United Kingdom imports of corn	
		American mixed (cents per bushel)	Yellow La Plata (cents per bushel)		From United States (thousand bushels)	From Argentina (thousand bushels)
1923-24						
November ...	82	n. q.	96	20	2	5,423
December ...	71	n. q.	102	258	5	2,203
January	76	106	103	1,649	67	1,597
February ...	78	115	115	2,202	274	662
March	77	113	111	2,755	1,413	917
April	77	106	107	1,119	958	645
May	77	108	112	888	638	1,328
June	82	100	100	234	528	3,656
July	109	112	94	20	27	9,748
August	117	112 ^b	104	28	2	7,995
September ..	114	n. q.	114	18	8	7,444
October	110	n. q.	124	70	..	7,154
Average, or total	88 ^a	109	107	9,261	3,922	48,772
1924-25						
November ...	111	n. q.	121	90	4	7,944
December ...	120	n. q.	122	19	400	4,577
January	124	n. q.	131	30	15	4,870
February ...	122	n. q.	129	11	..	3,005
March	117	n. q.	114	17	9	1,499
April	105	n. q.	111	17	..	458
May	115	n. q.	130	137	..	316
June	113	n. q.	128	10	110	613
July	108	n. q.	127	98	..	3,838
August	102	n. q.	138	17	..	3,139
September ..	91	n. q.	120	202	38	6,262
October	82	119	103	349	104	4,389
Average, or total	106 ^a	...	123	997	680	40,910
1925-26						
November ...	83	116	107	11	17	2,253
December ...	76	n. q.	110	1,287	11	2,982
January	79	101	97	3,053	694	5,143
February ...	75	100	91	1,326	338	6,135

^b Quotation for August 6 only.

TABLE X (Continued)

Year and month	Chicago—weighted average cash sales price of No. 3 yellow (cents per bushel)	Liverpool—average spot price		United States exports of corn overseas (thousand bushels)	United Kingdom imports of corn	
		American mixed (cents per bushel)	Yellow La Plata (cents per bushel)		From United States (thousand bushels)	From Argentina (thousand bushels)
March	72	92	89	542	330	3,382
April	71	97	94	864	219	2,044
May	71	92 ^c	89	310	173	1,145
June	70	94	87	96	20	1,875
July	78	102	100	229	50	5,100
August	80	n. q.	98	15	108	3,334
September ..	79	109 ^d	90	55	95	6,483
October	77	109 ^c	93	54	40	5,670
Average, or total	75 ^a	101	95	7,842	2,095	45,546
1926-27						
November ...	71	n. q.	95	72	18	4,752
December ...	75	n. q.	92	216	93	5,175
January	74	114	89	343	90	6,350
February ...	73	107	93	550	342	5,699
March	68	100	87	507	199	5,899
April	71	97	88	187	108	4,639
May	87	99	94	271	141	3,824
June	99	106	93	176	38	6,012
July	102	111	91	63	22	5,436
August	109	118	98	12	..	6,994
September ..	97	n. q.	97	10	..	8,518
October	84	n. q.	96	15	..	6,195
Average, or total	87 ^a	107	93	2,422	1,052	69,493
1927-28						
November ...	84	n. q.	97	66	50	6,071
December ...	86	n. q.	104	456	198	5,644
January	89	115	110	700	138	5,239
February ...	95	118	119	3,251	334	3,839
March	99	122	127	2,494	702	3,542
April	106	124	129	2,387	465	967
May	108	130	127	355	182	1,491

^a Quotation for May 25 only.

^d Quotation for September 28 only.

^c Quotations for October 5 and 12 only.

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TABLE X (Continued)

Year and month	Chicago— weighted average cash sales price of No. 3 yellow (cents per bushel)	Liverpool—average spot price		United States exports of corn overseas (thousand bushels)	United Kingdom imports of corn	
		American mixed (cents per bushel)	Yellow La Plata (cents per bushel)		From United States (thousand bushels)	From Argentina (thousand bushels)
June	103	130	125	153	48	3,851
July	106	123	123	106	9	5,856
August	102	123	119	370	408	5,486
September ..	100	122	107	4	118	7,451
October	96	122	116	27	2	5,088
Average, or total	101*	123	117	10,369	2,654	54,525
1928-29						
November ...	84	124	123	405	11	2,872
December ...	83	n. q.	120	3,796	642	3,679
January	93	121	124	10,515	2,018	5,801
February ...	94	122	127	6,729	2,856	2,255
March	94	117	124	3,569	1,236	1,712
April	90	114	120	1,096	1,016	1,450
May	87	110	107	44	144	2,146
June	91	110	104	96	21	4,832
July	99	119 [†]	118	41	..	3,790
August	101	122	113	44	x	4,934
September ..	101	120	107	41	..	6,535
October	95	112	103	8	..	6,855
Average, or total	92*	117	116	26,384	7,944	46,861
1929-30						
November ...	88	105	99	7	..	3,728
December ...	88	101	89	10	..	4,365
January	85	n. q.	84	13	..	3,745
February ...	82	91	79	48	..	2,982
March	80	88	75	20	3	3,822
April	82	83 [†]	91	14	3	2,859
May	79	85 [‡]	85	15	x	1,980
June	79	...	76	11	1	3,193
July	82	...	84	5	x	1,724
August	99	...	90	7	10	2,225

[†] Beginning July 24, 1929, quotations are for American Yellow.

* Quotation for April 2 only.

[‡] Quotation for May 21 only.

TABLE X (Concluded)

Year and month	Chicago—weighted average cash sales price of No. 3 yellow (cents per bushel)	Liverpool—average spot price		United States exports of corn overseas (thousand bushels)	United Kingdom imports of corn	
		American mixed (cents per bushel)	Yellow La Plata (cents per bushel)		From United States (thousand bushels)	From Argentina (thousand bushels)
September ..	94	...	77	6	..	4,325
October	82	...	62	5	..	6,182
Average, or total	83 ^a	...	83	161	17	41,130
1930-31						
November ...	71	...	52	6	..	5,935
December ...	69	...	54	7	4	5,871
January	65	...	48	40	x	8,374
February ...	61	...	49	67	1	4,923
March	60	...	58	106	6	6,335
April	58	...	62	9	1	3,367
May	56	...	57	6	x	5,822
June	58	...	50	10	x	7,246
July	57	...	47	10	x	7,246
August	46	...	44	2	..	9,992
September ..	42	...	41	3	x	8,070
October	38	...	40	x	x	11,878
Average, or total	60 ^a	...	50	265	13	83,301

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TABLE XI.—PRODUCTION, CONSUMPTION, AND EXPORTS OF PORK AND LARD AND INCREASE OVER (OR DECREASE UNDER) PREVIOUS YEAR, 1900-30*

(Million pounds)

Year	Production under federal inspection	Increase over (or decrease under) previous year's production	Consumption (dressed-weight basis)	Increase over (or decrease under) previous year's consumption	Exports	Increase over (or decrease under) previous year's exports
1900....	3,549	...	5,929	...	1,462	...
1901....	3,581	+ 32	5,898	- 31	1,471	+ 9
1902....	3,264	- 317	5,516	- 382	1,148	- 323
1903....	3,309	+ 45	5,756	+ 240	1,110	- 38
1904....	3,660	+ 351	6,210	+ 454	1,156	+ 46
1905....	3,538	- 222	5,793	- 417	1,392	+ 236
1906....	3,812	+ 274	6,087	+ 294	1,418	+ 26
1907....	4,900	+1,088	6,811	+ 724	1,209	- 209
1908....	5,306	+ 406	7,087	+ 276	1,219	+ 10
1909....	4,431	- 875	6,497	- 590	947	- 272
1910....	3,904	- 527	6,319	- 178	706	- 241
1911....	4,987	+1,083	7,109	+ 790	1,080	+ 374
1912....	4,767	- 220	6,941	- 168	1,014	- 66
1913....	4,964	+ 197	7,177	+ 236	1,049	+ 35
1914....	4,784	- 180	7,294	+ 117	858	- 191
1915....	5,334	+ 550	7,189	- 105	1,407	+ 549
1916....	5,819	+ 485	7,423	+ 234	1,485	+ 78
1917....	4,576	-1,243	6,232	-1,191	1,329	- 156
1918....	6,247	+1,671	7,058	+ 826	2,273	+ 944
1919....	6,314	+ 67	7,047	- 11	2,667	+ 394
1920....	5,860	- 454	7,853	+ 806	1,572	-1,095
1921....	6,109	+ 249	8,109	+ 256	1,662	+ 90
1922....	6,732	+ 623	8,818	+ 709	1,526	- 136
1923....	8,322	+1,590	10,045	+1,227	2,035	+ 509
1924....	7,980	- 342	10,241	+ 196	1,721	- 314
1925....	6,687	-1,293	9,316	- 925	1,268	- 453
1926....	6,612	- 75	9,274	- 42	1,159	- 109
1927....	7,052	+ 440	9,756	+ 482	1,033	- 126
1928....	7,819	+ 767	10,626	+ 870	1,135	+ 102
1929....	7,674	- 145	10,571	- 55	1,245	+ 110
1930....	6,921	- 753	10,098	- 473	988	- 257

* Data from U.S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption, and Foreign Trade of the United States, 1900-1930* (preliminary report), March 1931, pp. 8-9.

TABLE XII.—AVERAGE PRICE OF BACON, WILTSHIRE SIDES,* GREEN, FIRSTS, AT BRISTOL, ENGLAND, 1909-13 AND 1921-30*

(Cents per pound)

Year	American	Canadian	Danish	Irish	British
1909	13.6	14.3	15.0	15.9	16.7
1910	15.2	15.6	15.9	16.6	17.8
1911	12.8	13.1	14.3	14.8	15.8
1912	13.8	14.5	15.9	15.8	16.3
1913	15.8	16.3	17.1	17.4	18.4
Average.....	14.2	14.8	15.6	16.1	17.0
1921	21.8	26.5	32.8	34.7	36.2
1922	21.2	25.2	29.7	32.5	33.3
1923	17.5	20.9	23.6	25.8	27.0
1924	16.6	19.2	21.3	22.8	23.5
1925	23.0	24.7	27.5	29.7	30.0
1926 .....	....	....	27.8	30.6	32.3
1927 .....	....	....	21.1	25.5	26.9
1928	17.9	....	21.2	23.7	25.8
1929 .....	....	....	24.5	26.6	28.3
1930	19.3	....	20.8	25.1	27.6
Average.....	19.6	23.3	25.0	27.7	29.1

* Entire half of hog in one piece, head off, backbone out, ribs in.

* Data from *Agriculture Yearbook, 1931*, p. 857. Dots (...) indicate that data are not available.

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TABLE XIII.—AVERAGE PRICES OF CORN AND HOGS RECEIVED BY PRODUCERS AND AVERAGE PRICES AT CHICAGO, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*

Crop year Nov.-Oct.	Average price received by producers		Average price at Chicago	
	Corn (cents per bushel)	Hogs (dollars per 100 pounds)	No. 3 yellow corn (cents per bushel)	Hogs (dollars per 100 pounds)
1909-10.....	63.6	....	60.0	8.99
1910-11.....	55.6	6.55	55.0	6.94
1911-12.....	70.6	6.52	70.0	7.36
1912-13.....	59.7	7.45	58.0	8.32
1913-14.....	73.1	7.64	70.0	8.38
Average.....	64.5	7.04	63.0	8.00
1921-22.....	55.6	8.22	58.0	9.10
1922-23.....	78.7	7.32	81.0	7.81
1923-24.....	86.6	7.15	89.0	7.79
1924-25.....	104.9	10.66	109.0	11.71
1925-26.....	71.1	11.69	76.0	12.30
1926-27.....	77.2	10.12	84.0	10.51
1927-28.....	88.8	8.81	98.0	9.51
1928-29.....	87.0	9.39	93.0	10.18
1929-30.....	80.3	8.94	85.0	9.66
1930-31.....	54.9	6.52	57.0	6.80
Average.....	78.5	8.88	83.0	9.54

* Based on data from *Agriculture Yearbooks*, 1930, p. 853, and 1931, pp. 625-26 and 850-51, supplemented by data supplied through the kindness of the Bureau of Agricultural Economics of the U.S. Department of Agriculture. Instead of using the weighted averages for the years, as given in the *Yearbooks*, we have taken arithmetic averages of the monthly prices.

TABLE XIV.—GROSS VALUE OF FARM PRODUCTION AND GROSS INCOME IN THE UNITED STATES,
1921-22 TO 1928-29*
(Million dollars)

Crop year July-June	Gross value of all farm productions ^a	Deductions for products fed, used for seed, and waste ^b	Gross income from farm production						All other
			Total	Grains	Meat animals	Fruits and vegetables	Cotton and cottonseed	Dairy and poultry products	
1921-22	12,894	3,680	9,214	1,266	1,932	1,379	760	2,877	1,000
1922-23	14,909	4,543	10,366	1,393	2,180	1,410	1,251	2,957	1,175
1923-24	16,249	4,961	11,288	1,393	2,167	1,526	1,608	3,315	1,279
1924-25	17,086	5,083	12,003	1,842	2,619	1,333	1,719	3,258	1,232
1925-26	16,995	4,325	12,670	1,594	2,848	1,686	1,749	3,589	1,204
1926-27	16,487	4,360	12,127	1,455	2,883	1,585	1,260	3,775	1,169
1927-28	17,153	4,849	12,304	1,605	2,871	1,500	1,476	3,630	1,222
1928-29	17,144	4,617	12,527	1,540	3,016	1,436	1,479	3,840	1,216

* Data from *Agriculture Yearbook, 1930*, p. 992. Interested readers will find an informative and more detailed discussion on "Income from Farm Production in the United States" in *Crops and Markets*, September 1931, VIII, 397-404.

^a These gross values of all farm production are here evaluated in terms of crop-year (practically July-June) production and weighed average farm prices.

^b These deductions, to obtain gross income, cover portions of crops and dairy products fed to livestock, used for seed in further crop production, and waste. For the industry as a whole these deductions constitute raw materials, the income from which is derived from the finished products sold or consumed in the farm home.

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TABLE XV.—DEVIATIONS OF MONTHLY WEIGHTED AVERAGE PRICES OF
AGE PRICE OF PREVIOUS MONTH,
(Cents per bushel)

Year	Nov.	Dec.	Jan.	Feb.	Mar.
1899-1900.....	..	- 1	0	+2	+4
1900-01.....	- 5	- 2	+ 1	+1	+2
1901-02.....	+ 4	+ 4	- 2	-3	0
1902-03.....	- 7	- 7	- 3	0	-2
1903-04.....	- 1	0	- 1	+3	0
1904-05.....	- 7	- 5	- 1	+2	+3
1905-06.....	- 8	- 3	0	0	-2
Average.....	5.3	3.1	1.1	1.6	1.9
1906-07.....	- 3	- 1	- 1	+2	0
1907-08.....	- 6	- 1	- 5	+1	+9
1908-09.....	-14	- 4	+ 5	+1	+1
1909-10.....	0	0	+ 5	-1	-2
1910-11.....	- 1	- 4	0	0	0
1911-12.....	- 5	- 7	+ 1	+2	+4
1912-13.....	-13	- 6	0	+2	+1
1913-14.....	+ 2	- 6	- 4	0	+2
Average.....	5.5	3.6	2.6	1.1	2.4
1921-22.....	+ 2	0	+ 1	+7	+2
1922-23.....	+ 2	+ 2	- 3	+2	+1
1923-24.....	-22	-11	+ 5	+2	-1
1924-25.....	+ 1	+ 9	+ 4	-2	-5
1925-26.....	+ 1	- 7	+ 3	-4	-3
1926-27.....	- 6	+ 4	- 1	-1	-5
1927-28.....	0	+ 2	+ 3	+6	+4
1928-29.....	-12	- 1	+10	+1	0
1929-30.....	- 7	0	- 3	-3	-2
1930-31.....	-11	- 2	- 4	-4	-1
Average.....	6.4	3.8	3.7	3.2	2.4

* Based on data from *Agriculture Yearbooks*, 1924, p. 612, and 1931, p. 626, U.S. Department of Agriculture. Averages computed without regard to plus and

REPORTED CASH SALES OF NO. 3 YELLOW CORN AT CHICAGO FROM AVER-
1899-1900 TO 1913-14 AND 1921-22 TO 1930-31*

(Cents per bushel)

Apr.	May	June	July	Aug.	Sept.	Oct.	Average
+ 3	- 1	+ 2	+ 1	- 1	0	+ 2	1.5
+ 3	+ 1	- 1	+ 6	+ 8	0	0	2.5
+ 3	0	+ 1	+ 2	- 5	- 1	+ 1	2.2
0	+ 5	+ 3	+ 2	+ 2	- 2	- 6	3.2
+ 3	0	+ 1	- 1	+ 3	+ 1	+ 2	1.3
+ 1	+ 2	+ 5	+ 2	- 3	- 1	0	2.7
+ 2	+ 5	+ 2	+ 3	+ 2	- 7	- 1	2.9
2.1	2.0	2.1	2.4	3.4	1.7	1.7	2.4
+ 1	+ 8	+ 1	+ 1	+ 3	+ 7	+ 1	2.4
+ 2	+ 8	- 1	+ 4	+ 5	- 1	- 3	3.8
+ 3	+ 4	+ 2	- 3	- 2	- 1	- 10	4.2
- 4	+ 3	- 1	+ 3	+ 2	- 6	- 8	2.9
+ 5	+ 4	+ 1	+ 8	+ 2	+ 2	+ 6	2.8
+ 10	+ 1	- 4	- 7	+ 11	- 5	- 9	5.5
+ 6	+ 2	+ 3	+ 2	+ 12	+ 1	- 5	4.4
+ 3	+ 3	+ 2	- 1	+ 11	- 3	- 6	3.6
4.2	4.1	1.9	3.6	6.0	3.2	6.0	3.7
+ 1	+ 4	- 1	+ 3	- 2	+ 2	+ 5	2.5
+ 6	+ 3	+ 2	+ 4	0	+ 1	+ 15	3.4
0	0	+ 5	+ 27	+ 8	- 3	- 4	7.3
- 12	+ 10	- 2	- 5	- 6	- 11	- 9	6.3
- 1	0	- 1	+ 8	+ 2	- 1	- 2	2.8
+ 3	+ 16	+ 12	+ 3	+ 7	- 12	- 13	6.9
+ 7	+ 2	- 5	+ 3	- 4	- 2	- 4	3.5
- 4	- 3	+ 4	+ 8	+ 2	0	- 6	4.2
+ 2	- 3	0	+ 3	+ 17	- 5	- 12	4.8
- 2	- 2	+ 2	- 1	- 11	- 4	- 4	4.0
3.8	4.3	3.4	6.5	5.9	4.1	7.4	4.6

supplemented by data obtained from the Bureau of Agricultural Economics of the
minus signs.

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TABLE XVI.—DEVIATIONS OF MONTHLY WEIGHTED AVERAGE PRICES OF
(ARITHMETIC) AVERAGE PRICE OF THE YEAR,
(Cents per bushel)

Year	Nov.	Dec.	Jan.	Feb.	Mar.
1899-1900.....	- 6	- 7	- 7	- 5	- 1
1900-01.....	- 7	- 9	- 8	- 7	- 5
1901-02.....	- 1	+ 3	+ 1	- 2	- 2
1902-03.....	+ 6	- 1	- 4	- 4	- 6
1903-04.....	- 4	- 4	- 5	- 2	- 2
1904-05.....	- 2	- 7	- 8	- 6	- 3
1905-06.....	- 1	- 4	- 4	- 4	- 6
Average.....	3.9	5.0	5.3	4.3	3.6
1906-07.....	- 7	- 8	- 9	- 7	- 7
1907-08.....	- 9	-10	-15	-14	- 5
1908-09.....	- 4	- 8	- 3	- 2	- 1
1909-10.....	- 1	- 1	+ 4	+ 3	+ 1
1910-11.....	- 6	-10	-10	-10	-10
1911-12.....	- 2	- 9	- 8	- 6	- 2
1912-13.....	- 6	-12	-12	-10	- 9
1913-14.....	+ 2	- 4	- 8	- 8	- 6
Average.....	4.6	7.8	8.6	7.5	5.1
1921-22.....	-11	-11	-10	- 3	- 1
1922-23.....	-10	- 8	-11	- 9	- 8
1923-24.....	- 7	-18	-13	-11	-12
1924-25.....	+ 2	+11	+15	+13	+ 8
1925-26.....	+ 7	0	+ 3	- 1	- 4
1926-27.....	-13	- 9	-10	-11	-16
1927-28.....	-14	-12	- 9	- 3	+ 1
1928-29.....	- 9	-10	0	+ 1	+ 1
1929-30.....	+ 3	+ 3	0	- 3	- 5
1930-31.....	+14	+12	+ 8	+ 4	+ 3
Average.....	9.0	9.4	7.9	5.9	5.9

* Based on data from *Agriculture Yearbooks*, 1924, p. 612, and 1931, p. 626, U.S. Department of Agriculture. Averages computed without regard to plus and

REPORTED CASH SALES OF NO. 3 YELLOW CORN AT CHICAGO FROM
1899-1900 TO 1913-14 AND 1921-22 TO 1930-31*

(Cents per bushel)

Apr.	May	June	July	Aug.	Sept.	Oct.	Average
+ 2	+ 1	+ 3	+ 4	+ 3	+ 3	+ 5	3.9
- 2	- 1	- 2	+ 4	+12	+12	+12	6.8
+ 1	+ 1	+ 2	+ 4	- 1	- 2	- 1	1.8
- 6	- 1	+ 2	+ 4	+ 6	+ 4	- 2	3.8
+ 1	+ 1	+ 2	+ 1	+ 4	+ 5	+ 7	3.2
- 2	0	+ 5	+ 7	+ 4	+ 3	+ 3	4.2
- 4	+ 1	+ 3	+ 6	+ 8	+ 1	0	3.5
2.6	0.9	2.7	4.3	5.4	4.3	4.3	3.9
- 6	+ 2	+ 3	+ 4	+ 7	+14	+15	7.4
- 3	+ 5	+ 4	+ 8	+13	+12	+ 9	8.9
+ 2	+ 6	+ 8	+ 5	+ 3	+ 2	- 8	4.3
- 3	0	- 1	+ 2	+ 4	- 2	-10	2.7
- 5	- 1	0	+ 8	+10	+12	+18	8.3
+ 8	+ 9	+ 5	- 2	+ 9	+ 4	- 5	5.8
- 3	- 1	+ 2	+ 4	+16	+17	+12	8.7
- 3	0	+ 2	+ 1	+12	+ 9	+ 3	4.8
4.1	3.0	3.1	4.2	9.2	9.0	10.0	6.4
0	+ 4	+ 3	+ 6	+ 4	+ 6	+11	5.8
- 2	+ 1	+ 3	+ 7	+ 7	+ 8	+23	8.1
-12	-12	- 7	+20	+28	+25	+21	15.5
- 4	+ 6	+ 4	- 1	- 7	-18	-27	9.7
- 5	- 5	- 6	+ 2	+ 4	+ 3	+ 1	3.4
-13	+ 3	+15	+18	+25	+13	0	12.2
+ 8	+10	+ 5	+ 8	+ 4	+ 2	- 2	6.5
- 3	- 6	- 2	+ 6	+ 8	+ 8	+ 2	4.7
- 3	- 6	- 6	- 3	+14	+ 9	- 3	4.8
+ 1	- 1	+ 1	0	-11	-15	-19	7.4
5.1	5.4	5.2	7.1	11.2	10.7	10.9	7.8

supplemented by data obtained from the Bureau of Agricultural Economics of the minus signs.

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TABLE XVII.—DEVIATIONS OF MONTHLY AVERAGE PRICES OF LIVE HOGS
1913-14 AND

(Cents per 100 pounds)

Crop year Nov.-Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1900-01.....	...	...	...	+ 10	+ 50
1901-02.....	- 45	+30	+ 25	- 10	+ 25
1902-03.....	- 70	-10	+ 20	+ 35	+ 55
1903-04.....	- 90	-20	+ 45	+ 25	+ 20
1904-05.....	- 60	-30	+ 15	+ 20	+ 30
1905-06.....	- 40	+ 5	+ 50	+ 60	+ 30
Average.....	61.0	19.0	31.0	26.7	35.0
1906-07.....	- 20	+ 5	+ 35	+ 45	- 40
1907-08.....	-125	-20	- 30	+ 5	+ 55
1908-09.....	- 15	-15	+ 45	+ 25	+ 35
1909-10.....	+ 25	+35	+ 20	+ 50	+150
1910-11.....	- 90	+ 5	+ 30	- 55	- 55
1911-12.....	- 15	+10	- 15	- 5	+ 90
1912-13.....	-100	-35	+ 5	+ 70	+ 75
1913-14.....	- 45	- 5	+ 60	+ 30	+ 10
Average.....	54.4	16.2	30.0	35.6	63.8
1921-22.....	- 71	- 9	+110	+188	+ 53
1922-23.....	- 73	+11	+ 11	- 27	+ 16
1923-24.....	- 57	+ 2	+ 23	- 4	+ 29
1924-25.....	- 94	+41	+100	+ 68	+249
1925-26.....	- 3	-31	+105	+ 43	- 25
1926-27.....	- 92	-23	+ 39	- 23	- 45
1927-28.....	-147	-60	- 7	- 17	0
1928-29.....	- 74	-22	+ 61	+ 97	+125
1929-30.....	- 32	+28	+ 44	+ 89	- 50
1930-31.....	- 79	-63	- 27	- 59	+ 40
Average.....	72.2	29.0	52.7	61.5	63.2

* Based on data from *Agriculture Yearbook, 1931*, p. 851, supplemented by data
Agriculture. Averages computed without regard to plus and minus signs.

AT CHICAGO FROM AVERAGE PRICE OF PREVIOUS MONTH, 1900-01 TO
1921-22 TO 1930-31*

(Cents per 100 pounds)

Apr.	May	June	July	Aug.	Sept.	Oct.	Average
+ 5	- 10	+10	0	+ 5	+ 65	- 50	22.8
+ 60	+ 5	+35	+ 30	- 50	+ 40	- 55	34.2
- 10	- 75	-45	- 45	- 10	+ 40	- 30	37.1
- 25	- 45	+40	+ 35	- 10	+ 45	- 35	36.2
+ 30	- 5	- 5	+ 30	+ 30	- 45	- 25	27.1
+ 25	- 10	+10	+ 10	- 40	0	+ 15	24.6
25.8	25.0	24.2	25.0	24.2	39.2	35.0	30.6*
0	- 25	-30	- 5	- 5	0	+ 15	18.8
+ 85	- 35	+30	+ 70	+ 5	+ 30	- 90	48.3
+ 50	+ 10	+35	+ 20	- 10	+ 45	- 45	29.2
- 65	- 35	-10	- 70	- 40	+ 55	- 40	49.6
- 60	- 25	+25	+ 45	+ 60	- 40	- 45	44.6
+ 70	- 15	-15	+ 15	+ 60	+ 20	+ 30	30.0
+ 15	- 50	+10	+ 40	- 70	- 5	- 10	40.4
- 5	- 20	-25	+ 50	+ 30	- 15	-120	34.6
43.8	26.9	22.5	39.4	35.0	26.2	49.4	36.9
- 12	+ 17	-15	- 63	-119	+ 24	+ 5	57.2
- 10	- 55	-61	+ 12	+ 61	+ 70	- 93	41.7
+ 1	- 2	-30	+ 64	+170	+ 19	+ 34	36.2
-100	- 49	+51	+ 89	- 80	- 14	-121	88.0
+ 13	+ 22	+46	-150	-103	+ 55	+ 69	55.4
- 59	-110	-81	+ 27	- 2	+119	+ 17	53.1
+120	+ 39	+24	+ 74	+ 88	+ 36	-232	70.3
- 3	- 60	- 9	+ 48	- 68	- 67	- 47	56.8
- 17	+ 2	-50	- 79	+ 85	+ 18	- 42	44.7
- 20	- 73	-17	- 3	- 35	- 57	- 32	42.1
35.5	42.9	38.4	60.9	81.1	47.9	69.2	54.5

obtained from the Bureau of Agricultural Economics of the U.S. Department of

* Weighted average.

616 *CORN AND HOG SURPLUS OF THE CORN BELT*TABLE XVIII.—DEVIATIONS OF MONTHLY AVERAGE PRICES OF LIVE
1900-01 TO 1913-14

(Cents per 100 pounds)

Crop year Nov.-Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1900-01.....	...	...	- 61	- 51	- 1
1901-02.....	-109	- 79	- 54	- 64	- 39
1902-03.....	+ 5	- 5	+ 15	+ 50	+105
1903-04.....	- 45	- 65	- 20	+ 5	+ 25
1904-05.....	- 41	- 71	- 56	- 36	- 6
1905-06.....	-120	-115	- 65	- 5	+ 25
Average.....	64.0	67.0	45.2	35.2	33.5
1906-07.....	- 14	- 9	+ 26	+ 71	+ 31
1907-08.....	- 64	- 84	-114	-109	- 54
1908-09.....	-122	-137	- 92	- 67	- 32
1909-10.....	- 99	- 64	- 44	+ 6	+156
1910-11.....	+ 66	+ 71	+101	+ 46	- 9
1911-12.....	-106	- 96	-111	-116	- 26
1912-13.....	- 57	- 92	- 87	- 17	+ 58
1913-14.....	- 63	- 68	- 8	+ 22	+ 32
Average.....	73.9	77.8	72.9	56.8	49.8
1921-22.....	-209	-218	-108	+ 80	+133
1922-23.....	+ 26	+ 37	+ 48	+ 21	+ 37
1923-24.....	- 94	- 92	- 69	- 73	- 44
1924-25.....	-274	-233	-133	- 65	+184
1925-26.....	-102	-133	- 28	+ 15	- 10
1926-27.....	+129	+106	+145	+122	+ 77
1927-28.....	- 59	-119	-126	-143	-143
1928-29.....	-135	-157	- 96	+ 1	+126
1929-30.....	- 60	- 32	+ 12	+101	+ 51
1930-31.....	+175	+112	+ 85	+ 26	+ 66
Average.....	126.3	123.9	85.0	64.7	87.1

* Based on data from *Agriculture Yearbook, 1931*, p. 851, supplemented by data Agriculture. Averages computed without regard to plus and minus signs.

HOGS AT CHICAGO FROM (ARITHMETIC) AVERAGE PRICE OF THE YEAR,
AND 1921-22 TO 1930-31*

(Cents per 100 pounds)

Apr.	May	June	July	Aug.	Sept.	Oct.	Average
+ 4	- 6	+ 4	+ 4	+ 9	+ 74	+ 24	23.8
+ 21	+ 26	+ 61	+ 91	+ 41	+ 81	+ 26	57.7
+ 95	+ 20	- 25	- 70	- 80	- 40	- 70	48.3
0	- 45	- 5	+ 30	+ 20	+ 65	+ 30	29.6
+ 24	+ 19	+ 14	+ 44	+ 74	+ 29	+ 4	34.8
+ 50	+ 40	+ 50	+ 60	+ 20	+ 20	+ 35	50.4
32.3	26.0	26.5	49.8	40.7	51.5	31.5	41.3 ^a
+ 31	+ 6	- 24	- 29	- 34	- 34	- 19	27.3
+ 31	- 4	+ 26	+ 96	+101	+131	+ 41	71.2
+ 18	+ 28	+ 63	+ 83	+ 73	+118	+ 73	75.5
+ 91	+ 56	+ 46	- 24	- 64	- 9	- 49	59.0
- 69	- 94	- 69	- 24	+ 36	- 4	- 49	53.2
+ 44	+ 29	+ 14	+ 29	+ 89	+109	+139	75.7
+ 73	+ 23	+ 33	+ 73	+ 3	- 2	- 12	44.2
+ 27	+ 7	- 18	+ 32	+ 62	+ 47	- 73	38.2
48.0	30.9	36.6	48.8	57.8	56.8	56.9	55.5
+121	+138	+123	+ 60	- 59	- 35	- 30	109.5
+ 27	- 28	- 89	- 77	- 16	+ 54	- 39	41.6
- 43	- 45	- 75	- 11	+159	+178	+212	91.2
+ 84	+ 35	+ 86	+175	+ 95	+ 81	- 40	123.8
+ 3	+125	+171	+ 21	- 82	- 27	+ 42	63.2
+ 18	- 92	-173	-146	-148	- 29	- 12	99.8
- 23	+ 16	+ 40	+114	+202	+238	+ 6	102.4
+123	+ 63	+ 54	+102	+ 34	- 33	- 80	83.7
+ 34	+ 36	- 14	- 93	- 8	+ 10	- 32	40.2
+ 46	- 27	- 44	- 47	- 82	-139	-171	85.0
52.2	60.5	86.9	84.6	88.7	82.4	66.4	84.1

obtained from the Bureau of Agricultural Economics of the U.S. Department of

^a Weighted average.

TABLE XIX.—DEVIATIONS OF MONTHLY HOG SLAUGHTER UNDER
AND DEVIATIONS EXPRESSED AS PERCENTAGES,

Year	Nov.	Dec.	Jan.	Feb.	Mar.
(Thousands)					
1906-07.....	...	...	...	- 489	- 256
1907-08.....	- 84	+ 959	+1,867	-1,071	- 779
1908-09.....	+ 435	+ 344	- 271	-1,223	+ 360
1909-10.....	+ 403	+ 290	- 397	- 369	- 433
1910-11.....	+ 605	+ 371	- 85	- 109	+ 340
1911-12.....	+ 919	- .36	+ 544	- 845	- 602
1912-13.....	+ 565	+ 387	+ 301	- 864	- 510
1913-14.....	+ 484	+ 754	- 430	- 766	- 175
Average.....	499.3	448.7	556.4	717.0	431.9
1921-22.....	+ 581	+ 360	+ 178	- 505	- 130
1922-23.....	+ 986	+ 883	- 67	- 903	+ 607
1923-24.....	+1,013	+ 563	+ 7	- 905	- 470
1924-25.....	+1,143	+1,959	- 621	-1,532	-1,148
1925-26.....	+ 332	+ 887	- 32	-1,150	+ 211
1926-27.....	+ 634	+ 784	+ 120	-1,119	+ 442
1927-28.....	+ 719	+1,181	+ 610	+ 301	- 640
1928-29.....	+ 742	+1,327	- 44	-1,260	- 833
1929-30.....	+ 642	+ 584	- 82	- 967	- 642
Average.....	754.7	947.6	195.7	960.2	569.2
(Percentage)					
1906-07.....	...	...	....	- 14.3	- 8.8
1907-08.....	- 3.8	+ 44.9	+ 60.3	- 21.6	- 20.0
1908-09.....	+ 12.9	+ 9.0	- 6.5	- 31.6	+ 13.6
1909-10.....	+ 16.8	+ 10.4	- 12.8	- 13.7	- 18.6
1910-11.....	+ 32.7	+ 15.1	- 3.0	- 4.0	+ 12.9
1911-12.....	+ 33.8	- 1.0	+ 15.1	- 20.4	- 18.2
1912-13.....	+ 23.0	+ 12.8	+ 8.8	- 23.3	- 17.9
1913-14.....	+ 18.1	+ 23.8	- 11.0	- 22.0	- 6.4
Average.....	20.2	16.7	16.8	18.9	14.6
1921-22.....	+ 20.3	+ 10.4	+ 4.7	- 12.7	- 3.7
1922-23.....	+ 29.6	+ 20.4	- 1.3	- 17.6	+ 14.3
1923-24.....	+ 23.4	+ 10.5	+ 0.1	- 15.3	- 9.4
1924-25.....	+ 32.7	+ 42.2	- 9.4	- 25.6	- 25.8
1925-26.....	+ 10.0	+ 24.3	- 0.7	- 25.5	+ 6.3
1926-27.....	+ 21.3	+ 21.7	+ 2.7	- 24.8	+ 13.0
1927-28.....	+ 24.2	+ 32.0	+ 12.5	+ 5.5	- 11.1
1928-29.....	+ 20.0	+ 29.8	- 0.8	- 22.0	- 18.6
1929-30.....	+ 16.6	+ 13.0	- 1.6	- 19.3	- 15.9
Average.....	22.0	22.7	3.8	18.7	13.1

* Based on data from *Agriculture Yearbook, 1931*, p. 851. Averages computed

* Weighted average.

FEDERAL INSPECTION FROM HOG SLAUGHTER OF PREVIOUS MONTH,
1906-07 TO 1913-14 AND 1921-22 TO 1929-30*

Apr.	May	June	July	Aug.	Sept.	Oct.	Average
(Thousands)							
+ 2	+650	- 76	- 312	- 628	-313	+ 231	328.6
- 807	+784	+ 6	- 678	- 185	0	+1,137	696.4
- 670	+286	+ 90	- 622	- 275	+133	+ 442	429.2
- 113	+428	+406	- 624	- 164	-260	+ 287	347.8
- 384	+419	+454	- 902	- 528	+140	+ 548	407.1
- 288	+432	- 9	- 481	- 479	-174	+ 754	463.6
+ 153	+559	+ 11	- 500	- 289	-135	+ 548	401.8
- 236	+257	+357	- 666	- 461	+108	+ 775	455.8
331.6	476.9	176.1	598.1	376.1	157.9	590.2	444.9*
- 404	+770	+330	- 942	- 216	-141	+ 585	428.5
- 659	+146	- 22	- 320	- 427	-344	+1,116	540.0
- 463	+205	+ 10	- 174	-1,044	-213	+ 641	475.7
- 262	+149	+546	- 913	- 366	+145	+ 716	791.7
- 457	+ 26	+299	- 303	- 293	-218	+ 360	380.7
- 507	+436	+487	- 822	- 381	-516	+ 435	556.9
-1,694	+438	+194	-1,094	- 439	- 37	+1,205	712.7
+ 116	+ 37	- 42	- 159	- 467	- 26	+ 753	483.8
+ 88	+343	-134	- 502	- 463	+ 49	+ 719	434.6
516.7	283.3	229.3	581.0	455.1	187.7	725.6	533.8
(Percentage)							
+ 0.1	+ 24.4	- 2.3	- 9.6	- 21.4	- 13.6	+ 11.6	11.8
- 25.9	+ 34.0	+ 0.2	- 21.9	- 7.7	0.0	+ 51.0	24.3
- 22.2	+ 12.2	+ 3.4	- 22.9	- 13.1	+ 7.3	+ 22.6	14.8
- 6.0	+ 24.1	+ 18.4	- 23.9	- 8.2	- 14.3	+ 18.4	15.5
- 12.9	+ 16.2	+ 15.1	- 26.1	- 20.6	+ 6.9	+ 25.2	15.9
- 10.7	+ 17.9	- 0.3	- 17.0	- 20.3	- 9.3	+ 44.3	17.4
+ 6.6	+ 22.5	+ 0.4	- 16.4	- 11.3	- 6.0	+ 25.7	14.6
- 9.3	+ 11.1	+ 13.9	- 22.8	- 20.4	+ 6.0	+ 40.6	17.1
11.7	20.3	6.8	20.1	15.4	7.9	29.9	16.6*
- 12.1	+ 26.1	+ 8.9	- 23.3	- 7.0	- 4.9	+ 21.3	13.0
- 13.6	+ 3.5	- 0.5	- 7.4	- 10.7	- 9.7	+ 34.7	13.6
- 10.2	+ 5.0	+ 0.2	- 4.1	- 25.4	- 6.9	+ 22.4	11.1
- 7.9	+ 4.9	+ 17.1	- 24.5	- 13.0	+ 5.9	+ 27.6	19.7
- 12.8	+ 0.8	+ 9.5	- 8.8	- 9.4	- 7.7	+ 13.8	10.8
- 13.2	+ 13.1	+ 12.9	- 19.3	- 11.1	- 16.9	+ 17.2	15.6
- 33.0	+ 12.7	+ 5.0	- 26.8	- 14.7	- 1.5	+ 48.0	18.9
+ 3.2	+ 1.0	- 1.1	- 4.2	- 13.0	- 0.8	+ 24.3	11.6
+ 2.6	+ 9.9	- 3.5	- 13.6	- 14.5	+ 1.8	+ 25.9	11.5
12.1	8.6	6.5	14.7	13.2	6.2	26.1	14.0

without regard to plus and minus signs.

TABLE XX.—DEVIATIONS OF MONTHLY HOG SLAUGHTER UNDER
AND DEVIATIONS EXPRESSED AS PERCENTAGES.

Year	Nov.	Dec.	Jan.	Feb.	Mar.
(Thousands)					
1906-07*.....	...	...	+ 644	+ 155	- 101
1907-08.....	- 859	+ 100	+1,967	+ 896	+ 117
1908-09.....	+1,015	+1,359	+1,088	- 135	+ 225
1909-10.....	+ 582	+ 872	+ 475	+ 106	+ 327
1910-11.....	- 225	+ 146	+ 61	- 48	+ 292
1911-12.....	+ 817	+ 781	+1,325	+ 480	- 122
1912-13.....	+ 225	+ 612	+ 913	+ 49	- 461
1913-14.....	+ 473	+1,227	+ 797	+ 31	- 144
Average.....	599.4	728.1	908.8	237.5	223.6
1921-22.....	+ 43	+ 403	+ 581	+ 76	- 54
1922-23.....	+ 17	+ 900	+ 833	- 70	+ 537
1923-24.....	+ 935	+1,498	+1,505	+ 600	+ 130
1924-25.....	+ 799	+2,758	+2,137	+ 605	- 543
1925-26.....	+ 245	+1,132	+1,100	- 50	+ 161
1926-27.....	+ 20	+ 804	+ 924	- 195	+ 247
1927-28.....	- 322	+ 859	+1,469	+1,770	+1,130
1928-29.....	+ 363	+1,690	+1,646	+ 386	- 447
1929-30.....	+ 734	+1,318	+1,236	+ 269	- 373
Average.....	386.4	1,262.4	1,270.1	446.8	402.4
(Percentage)					
1906-07.....	....	...	+ 23.3	+ 5.6	- 3.7
1907-08.....	- 28.7	+ 3.3	+ 65.7	+ 29.9	+ 3.9
1908-09.....	+ 36.4	+ 48.7	+ 39.0	- 4.8	+ 8.1
1909-10.....	+ 26.2	+ 39.3	+ 21.4	+ 4.8	- 14.7
1910-11.....	- 8.4	+ 5.4	+ 2.3	- 1.8	+ 10.9
1911-12.....	+ 29.0	+ 27.7	+ 47.0	+ 17.0	- 4.3
1912-13.....	+ 8.1	+ 21.9	+ 32.7	+ 1.8	- 16.5
1913-14.....	+ 17.6	+ 45.6	+ 29.6	+ 1.2	- 5.3
Average.....	22.1	27.4	32.6	8.4	8.4
1921-22.....	+ 1.3	+ 11.8	+ 17.1	+ 2.2	- 1.6
1922-23.....	+ 0.4	+ 20.9	+ 19.4	- 1.6	+ 12.5
1923-24.....	+ 21.2	+ 34.0	+ 34.2	+ 13.6	+ 2.9
1924-25.....	+ 20.8	+ 71.8	+ 55.6	+ 15.7	- 14.1
1925-26.....	+ 7.2	+ 33.3	+ 32.3	- 1.5	+ 4.7
1926-27.....	+ 0.6	+ 22.4	+ 25.7	- 5.4	+ 6.9
1927-28.....	- 8.0	+ 21.4	+ 36.6	+ 44.1	+ 28.2
1928-29.....	+ 8.9	+ 41.3	+ 40.2	+ 9.4	- 10.9
1929-30.....	+ 19.5	+ 35.0	+ 32.8	+ 7.1	- 9.9
Average.....	9.8	32.4	32.7	11.2	10.2

* Based on data from *Agriculture Yearbook, 1931*, p. 851. Averages computed

• Deviations are from ten months' average (January-October).

FEDERAL INSPECTION FROM AVERAGE HOG SLAUGHTER FOR THE YEAR,
1906-07 TO 1913-14 AND 1921-22 TO 1929-30*

Apr.	May	June	July	Aug.	Sept.	Oct.	Average
(Thousands)							
- 99	+551	+475	+ 163	- 465	- 778	-547	397.8
-690	+ 94	+100	- 578	- 763	- 763	+374	608.4
-445	-159	- 69	- 691	- 966	- 833	-391	614.7
-440	- 12	+394	- 230	- 394	- 654	-367	404.4
- 92	+327	+781	- 121	- 649	- 509	+ 39	274.2
-410	+ 22	+ 13	- 468	- 947	-1,121	-367	572.8
-308	+251	+262	- 238	- 527	- 662	-114	385.2
-380	-123	+234	- 432	- 893	- 785	- 10	460.8
358.0	192.4	291.0	365.1	700.5	763.1	276.1	466.2 ^b
-458	+312	+642	- 300	- 516	- 657	- 72	342.8
-122	+ 24	+ 2	- 318	- 745	-1,089	+ 27	390.3
-333	-128	-118	- 292	-1,336	-1,549	-908	777.7
-805	-656	-110	-1,023	-1,389	-1,244	-528	1,049.8
-296	-270	+ 29	- 274	- 567	- 785	-425	444.5
-260	+176	+663	- 159	- 540	-1,056	-621	472.1
-564	-126	+ 68	-1,026	-1,465	-1,502	-297	883.2
-331	-294	-336	- 495	- 962	- 988	-235	681.1
-285	+ 58	- 76	- 578	-1,041	- 992	-273	602.8
383.8	227.1	227.1	496.1	951.2	1,095.8	376.2	627.1
(Percentage)							
- 3.6	+ 19.9	+ 17.2	+ 5.9	- 16.8	- 28.1	- 19.8	14.4
- 23.0	+ 3.1	+ 3.3	- 19.3	- 25.5	- 25.5	+ 12.5	20.3
- 16.0	- 5.7	- 2.5	- 24.8	- 34.6	- 29.9	- 14.0	22.0
- 19.8	- 0.5	+ 17.8	- 10.4	- 17.8	- 29.5	- 16.5	18.2
- 3.4	+ 12.2	+ 29.1	- 4.5	- 24.2	- 19.0	+ 1.5	10.2
- 14.5	+ 0.8	+ 0.5	- 16.6	- 33.6	- 39.7	- 13.0	20.3
- 11.0	+ 9.0	+ 9.4	- 8.5	- 18.9	- 23.7	- 4.1	13.3
- 14.1	- 4.6	+ 8.7	- 16.0	- 33.2	- 29.2	- 0.4	17.1
13.2	7.2	11.1	13.2	25.6	28.1	10.2	17.1 ^b
- 13.5	+ 9.2	+ 18.9	- 8.8	- 15.2	- 19.3	- 2.1	10.1
- 2.8	+ 0.6	0.0	- 7.4	- 17.3	- 25.3	+ 0.6	9.1
- 7.6	- 2.9	- 2.7	- 6.6	- 30.3	- 35.2	- 20.6	17.6
- 21.0	- 17.1	- 2.9	- 26.6	- 36.2	- 32.4	- 13.7	27.3
- 8.7	- 7.9	+ 0.9	- 8.1	- 16.7	- 23.1	- 12.5	13.1
- 7.2	+ 4.9	+ 18.5	- 4.4	- 15.0	- 29.4	- 17.3	13.1
- 14.1	- 3.1	+ 1.7	- 25.6	- 36.5	- 37.5	- 7.4	22.0
- 8.1	- 7.2	- 8.2	- 12.1	- 23.5	- 24.1	- 5.7	16.6
- 7.6	+ 1.5	- 2.0	- 15.4	- 27.6	- 26.3	- 7.3	16.0
10.1	6.0	6.2	12.8	24.3	28.1	9.7	16.1

without regard to plus and minus signs.

* Weighted average.

622 CORN AND HOG SURPLUS OF THE CORN BELT

TABLE XXI.—AMOUNTS AND VALUES OF HOGS SLAUGHTERED UNDER FEDERAL INSPECTION, MONTHLY, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*

Year and month	Live hogs slaughtered under federal inspection ^a (thousands)	Average live weight at Chicago (pounds)	Average price per 100 pounds at Chicago (dollars)	Total live weight slaughtered under federal inspection (thousand pounds)	Total value of live weight slaughtered under federal inspection (thousand dollars)
1909-10					
November	2,800.1	225	8.00	630,022.5	50,401.8
December	3,090.2	214	8.35	661,302.8	55,218.8
January	2,692.8	210	8.55	565,488.0	48,349.2
February	2,323.6	213	9.05	494,926.8	44,790.9
March	1,891.0	218	10.55	412,238.0	43,491.1
April	1,778.4	227	9.90	403,696.8	39,966.0
May	2,206.5	239	9.55	527,353.5	50,362.3
June	2,612.1	242	9.45	632,128.2	59,736.1
July	1,988.4	246	8.75	489,146.4	42,800.3
August	1,824.0	255	8.35	465,120.0	38,837.5
September	1,563.8	259	8.90	405,024.2	36,047.2
October	1,850.8	253	8.50	468,252.4	39,801.5
Total or average	26,621.7	233	8.99	6,154,699.6	549,802.7
1910-11					
November	2,455.7	232	7.60	569,722.4	43,298.9
December	2,826.7	224	7.65	633,180.8	48,438.3
January	2,742.4	226	7.95	619,782.4	49,272.7
February	2,632.8	230	7.40	605,544.0	44,810.3
March	2,972.7	239	6.85	710,475.3	48,667.6
April	2,589.5	241	6.25	624,069.5	39,004.3
May	3,007.5	242	6.00	727,815.0	43,668.9
June	3,462.1	236	6.25	817,055.6	51,066.0
July	2,560.2	233	6.70	596,526.6	39,967.3
August	2,031.9	239	7.30	485,624.1	35,450.6
September	2,171.8	224	6.90	486,483.2	33,567.3
October	2,719.9	212	6.45	576,618.8	37,191.9
Total or average	32,173.2	232	6.94	7,452,897.7	514,404.1
1911-12					
November	3,639.3	208	6.30	756,974.4	47,689.4
December	3,602.9	213	6.40	767,417.7	49,114.7
January	4,146.7	212	6.25	879,100.4	54,943.8

* Data from *Agriculture Yearbooks*, 1930, p. 851, and 1931, pp. 847 and 851; and from *Crops and Markets*, supplemented by additional data furnished by the U.S. Department of Agriculture.

^a The figures include rejected carcasses.

TABLE XXI (Continued)

Year and month	Live hogs slaughtered under federal inspection* (thousands)	Average live weight at Chicago (pounds)	Average price per 100 pounds at Chicago (dollars)	Total live weight slaughtered under federal inspection (thousand pounds)	Total value of live weight slaughtered under federal inspection (thousand dollars)
February	3,302.0	217	6.20	716,534.0	44,425.1
March	2,700.4	218	7.10	588,687.2	41,796.8
April	2,411.9	227	7.80	547,501.3	42,705.1
May	2,843.9	232	7.65	659,784.8	50,473.5
June	2,835.5	235	7.50	666,342.5	49,975.7
July	2,353.9	239	7.65	562,582.1	43,037.5
August	1,875.3	240	8.25	450,072.0	37,130.9
September	1,701.1	235	8.45	399,758.5	33,779.6
October	2,454.9	226	8.75	554,807.4	48,545.6
Total or average	33,867.8	225	7.36	7,549,562.3	543,617.7
1912-13					
November	3,020.3	222	7.75	670,506.6	51,964.3
December	3,406.8	223	7.40	759,716.4	56,219.0
January	3,708.1	226	7.45	838,030.6	62,433.3
February	2,843.9	230	8.15	654,097.0	53,308.9
March	2,333.6	240	8.90	560,064.0	49,845.7
April	2,486.7	242	9.05	601,781.4	54,461.2
May	3,045.9	242	8.55	737,107.8	63,022.7
June	3,056.9	244	8.65	745,883.6	64,518.9
July	2,557.1	243	9.05	621,375.3	56,234.5
August	2,268.3	233	8.35	528,513.9	44,130.9
September	2,132.7	222	8.30	473,459.4	39,297.1
October	2,681.4	209	8.20	560,412.6	45,953.8
Total or average	33,541.7	231	8.32	7,750,948.6	641,390.3
1913-14					
November	3,165.2	207	7.75	655,196.4	50,777.7
December	3,918.7	213	7.70	834,683.1	64,270.6
January	3,489.4	216	8.30	753,710.4	62,558.0
February	2,722.8	224	8.60	609,907.2	52,452.0
March	2,547.8	233	8.70	593,637.4	51,646.5
April	2,311.7	233	8.65	538,626.1	46,591.2
May	2,569.0	236	8.45	606,284.0	51,231.0
June	2,925.6	237	8.20	693,367.2	56,856.1
July	2,259.5	244	8.70	551,318.0	47,964.7
August	1,799.0	248	9.00	446,152.0	40,153.7
September	1,907.4	242	8.85	461,590.8	40,850.8
October	2,681.9	229	7.65	614,155.1	46,982.9
Total or average	32,298.0	230	8.38	7,358,627.7	612,335.2

TABLE XXI (Continued)

Year and month	Live hogs slaughtered under federal inspection ^a (thousands)	Average live weight at Chicago (pounds)	Average price per 100 pounds at Chicago (dollars)	Total live weight slaughtered under federal inspection (thousand pounds)	Total value of live weight slaughtered under federal inspection (thousand dollars)
1921-22					
November	3,447.0	225	7.01	775,575.0	54,367.8
December	3,806.8	226	6.92	860,336.8	59,535.3
January	3,984.7	231	8.02	920,465.7	73,821.3
February	3,479.9	236	9.90	821,256.4	81,304.4
March	3,350.2	244	10.43	817,448.8	85,259.9
April	2,945.8	246	10.31	724,666.8	74,713.1
May	3,716.2	244	10.48	906,752.8	95,027.7
June	4,046.3	247	10.33	999,436.1	103,241.7
July	3,104.3	259	9.70	804,013.7	77,989.3
August	2,887.8	268	8.51	773,930.4	65,861.5
September	2,747.5	265	8.75	728,087.5	63,707.7
October	3,331.6	243	8.80	809,578.8	71,242.9
Total or average	40,848.1	244	9.10	9,941,548.8	906,072.6
1922-23					
November	4,318.0	231	8.07	997,458.0	80,494.9
December	5,201.4	234	8.18	1,217,127.6	99,561.0
January	5,134.0	239	8.29	1,227,026.0	101,720.5
February	4,230.6	241	8.02	1,019,574.6	81,769.9
March	4,837.8	247	8.18	1,194,936.6	97,745.8
April	4,179.4	249	8.08	1,040,670.6	84,086.2
May	4,325.1	242	7.53	1,046,674.2	78,814.6
June	4,302.5	242	6.92	1,041,205.0	72,051.4
July	3,983.4	250	7.04	995,850.0	70,107.8
August	3,556.0	253	7.65	899,668.0	68,824.6
September	3,212.4	254	8.35	815,949.6	68,131.8
October	4,328.0	247	7.42	1,069,016.0	79,321.0
Total or average	51,608.6	244	7.81	12,565,156.2	982,629.5
1923-24					
November	5,340.7	234	6.85	1,249,723.8	85,606.1
December	5,903.8	231	6.87	1,363,777.8	93,691.5
January	5,911.2	227	7.10	1,341,842.4	95,270.8
February	5,006.3	229	7.06	1,146,442.7	80,938.9
March	4,536.4	237	7.35	1,075,126.8	79,021.8
April	4,073.2	239	7.36	973,494.8	71,649.2
May	4,277.6	239	7.34	1,022,346.4	75,040.2
June	4,287.6	241	7.04	1,033,311.6	72,745.1

TABLE XXI (Continued)

Year and month	Live hogs slaughtered under federal inspections* (thousands)	Average live weight at Chicago (pounds)	Average price per 100 pounds at Chicago (dollars)	Total live weight slaughtered under federal inspection (thousand pounds)	Total value of live weight slaughtered under federal inspection (thousand dollars)
July	4,113.8	251	7.68	1,032,563.8	79,300.9
August	3,070.2	255	9.38	782,901.0	73,436.1
September	2,857.0	254	9.57	725,678.0	69,447.4
October	3,498.1	235	9.91	822,053.5	81,465.5
Total or average	52,875.9	239	7.79	12,569,262.6	957,613.5
1924-25					
November	4,640.9	220	8.97	1,020,998.0	91,583.5
December	6,600.3	214	9.38	1,412,464.2	132,489.1
January	5,978.6	220	10.38	1,315,292.0	136,527.3
February	4,446.9	222	11.06	987,211.8	109,185.6
March	3,299.3	229	13.55	755,539.7	102,375.6
April	3,036.7	235	12.55	713,624.5	89,559.9
May	3,186.1	236	12.06	751,919.6	90,681.5
June	3,731.5	238	12.57	888,097.0	111,633.8
July	2,819.4	249	13.46	702,030.6	94,493.3
August	2,452.8	256	12.66	627,916.8	79,494.3
September	2,597.9	253	12.52	657,268.7	82,290.0
October	3,314.4	242	11.31	802,084.8	90,715.8
Total or average	46,104.8	234	11.71	10,634,447.7	1,211,029.7
1925-26					
November	3,646.2	228	11.28	831,333.6	93,774.4
December	4,533.0	225	10.97	1,019,925.0	111,885.8
January	4,500.6	231	12.02	1,039,638.6	124,964.6
February	3,351.2	235	12.45	787,532.0	98,047.7
March	3,562.2	245	12.20	872,739.0	106,474.2
April	3,104.7	244	12.33	757,546.8	93,405.5
May	3,130.9	247	13.55	773,332.3	104,786.5
June	3,429.5	255	14.01	874,522.5	122,520.6
July	3,127.3	271	12.51	847,498.3	106,022.0
August	2,833.6	281	11.48	796,241.6	91,408.5
September	2,616.5	267	12.03	698,605.5	84,042.2
October	2,976.3	232	12.72	690,501.6	87,831.8
Total or average	40,812.0	247	12.30	9,989,416.8	1,225,163.8
1926-27					
November	3,609.9	217	11.80	783,348.3	92,435.1
December	4,393.6	220	11.57	966,592.0	111,834.7

626 CORN AND HOG SURPLUS OF THE CORN BELT

TABLE XXI (Continued)

Year and month	Live hogs slaughtered under federal inspection ^a (thousands)	Average live weight at Chicago (pounds)	Average price per 100 pounds at Chicago (dollars)	Total live weight slaughtered under federal inspection (thousand pounds)	Total value of live weight slaughtered under federal inspection (thousand dollars)
January	4,513.6	226	11.96	1,020,073.6	122,000.8
February	3,394.6	229	11.73	777,363.4	91,184.7
March	3,837.3	240	11.28	920,952.0	103,883.4
April	3,329.6	239	10.69	795,774.4	85,068.3
May	3,765.7	243	9.59	915,065.1	87,754.7
June	4,252.6	248	8.78	1,054,644.8	92,597.8
July	3,430.7	257	9.05	881,689.9	79,792.9
August	3,049.9	265	9.03	808,223.5	72,982.6
September	2,533.8	261	10.22	661,321.8	67,587.1
October	2,968.7	235	10.39	637,644.5	72,485.3
Total or average	43,080.0	240	10.51	10,282,693.3	1,079,607.4
1927-28					
November	3,688.4	215	8.92	793,006.0	70,736.1
December	4,868.6	217	8.32	1,056,486.2	87,899.7
January	5,479.0	225	8.25	1,232,775.0	101,703.9
February	5,779.8	230	8.08	1,329,354.0	107,411.8
March	5,139.8	235	8.08	1,207,853.0	97,594.5
April	3,446.3	233	9.28	802,987.9	74,517.3
May	3,884.4	234	9.67	908,949.6	87,895.4
June	4,078.0	239	9.91	974,642.0	96,587.0
July	2,984.2	251	10.65	749,034.2	79,772.1
August	2,545.3	257	11.53	654,142.1	75,422.6
September	2,508.3	251	11.89	629,583.3	74,857.5
October	3,713.0	247	9.57	917,111.0	87,767.5
Total or average	48,115.1	236	9.51	11,255,984.3	1,042,165.4
1928-29					
November	4,455.3	238	8.83	1,060,361.4	93,629.9
December	5,782.0	231	8.61	1,335,642.0	114,998.8
January	5,737.7	228	9.22	1,308,195.6	120,615.6
February	4,477.6	228	10.19	1,020,892.8	104,029.0
March	3,645.3	238	11.44	867,581.4	99,251.3
April	3,761.2	241	11.41	906,449.2	103,425.9
May	3,797.9	239	10.81	907,698.1	98,122.2
June	3,755.6	247	10.72	927,633.2	99,442.3
July	3,596.8	257	11.20	924,377.6	103,530.3
August	3,130.0	265	10.52	829,450.0	87,258.1
September	3,103.8	259	9.85	803,884.2	79,182.6
October	3,857.1	242	9.38	933,418.2	87,554.6
Total or average	49,100.3	243	10.18	11,825,583.7	1,191,040.6

TABLE XXI (Concluded)

Year and month	Live hogs slaughtered under federal inspection ^a (thousands)	Average live weight at Chicago (pounds)	Average price per 100 pounds at Chicago (dollars)	Total live weight slaughtered under federal inspection (thousand pounds)	Total value of live weight slaughtered under federal inspection (thousand dollars)
1929-30					
November	4,498.6	223	9.06	1,003,187.8	90,888.8
December	5,082.9	224	9.34	1,138,569.6	106,342.4
January	5,001.4	228	9.78	1,140,319.2	111,523.2
February	4,034.1	231	10.67	931,877.1	99,431.3
March	3,392.3	235	10.17	797,190.5	81,074.3
April	3,480.4	234	10.00	814,413.6	81,441.4
May	3,822.6	238	10.02	909,778.8	91,159.8
June	3,688.9	245	9.52	903,780.5	86,039.9
July	3,187.3	257	8.73	819,136.1	71,510.6
August	2,724.0	255	9.58	694,620.0	66,544.6
September	2,772.7	244	9.76	676,538.8	66,030.2
October	3,491.7	227	9.34	792,615.9	74,030.3
Total or average	45,176.9	237	9.66	10,622,027.9	1,026,016.8
1930-31					
November	4,023.7	221	8.55	889,237.7	76,029.8
December	4,646.6	226	7.92	1,050,131.6	83,170.4
January	5,362.0	235	7.65	1,260,070.0	96,395.4
February	4,141.9	237	7.06	981,630.3	69,303.1
March	3,522.9	242	7.46	852,541.8	63,599.6
April	3,488.5	240	7.26	837,240.0	60,783.6
May	3,408.1	240	6.53	817,944.0	53,411.7
June	3,251.2	251	6.36	816,051.2	51,900.9
July	2,766.6	258	6.33	713,792.9	45,183.1
August	2,499.9	256	5.98	639,979.5	38,270.8
September	2,954.6	240	5.41	709,095.6	38,362.1
October	3,771.8	222	5.09	837,334.9	42,620.3
Total or average	43,837.8	239	6.80	10,405,049.5	719,030.8

TABLE XXII.—RELATION OF UNITED STATES CORN CROP TO ESTIMATED WORLD CROP, 1901-02 TO 1930-31*

Crop year	Estimated world crop (million bushels)	United States crop (million bushels)	Relation of U. S. crop to world crop (percentage)	Crop year	Estimated world crop (million bushels)	United States crop (million bushels)	Relation of U. S. crop to world crop (percentage)
1901-02.....	2,813	1,614	57.4	1916-17.....	3,775*	2,567	68.0
1902-03.....	3,732	2,619	70.2	1917-18.....	4,178*	3,065	73.4
1903-04.....	3,602	2,347	65.2	1918-19.....	3,579*	2,503	69.9
1904-05.....	3,528	2,529	71.7	1919-20.....	4,242*	2,811	66.3
1905-06.....	3,936	2,749	69.8	1920-21.....	4,735	3,209	67.8
1906-07.....	4,180	2,898	69.3	1921-22.....	4,358	3,069	70.4
1907-08.....	3,832	2,512	65.6	1922-23.....	4,322	2,906	67.2
1908-09.....	3,913	2,545	65.0	1923-24.....	4,590	3,054	66.5
1909-10.....	3,913	2,572	65.7	1924-25.....	3,949	2,309	58.5
1910-11.....	4,162	2,886	69.3	1925-26.....	4,754	2,916	63.8
1911-12.....	4,002	2,531	63.2	1926-27.....	4,613	2,692	58.4
1912-13.....	4,415	3,125	70.8	1927-28.....	4,465	2,763	61.9
1913-14.....	3,974	2,447	61.6	1928-29.....	4,407	2,819	64.0
1914-15.....	4,186*	2,673	63.9	1929-30.....	4,496	2,614	58.1
1915-16.....	4,352*	2,995	68.8	1930-31.....	.....	2,094	.....

* Based on data in *Agriculture Yearbook, 1931*, p. 621, and *Crops and Markets, September 1931*, VIII, 348. Production figures are for the harvesting season, which begins in July, extends through the autumn in the Northern Hemisphere, and is completed in the early part of the following year in the Southern Hemisphere.

* Not including Russia.

TABLE XXIII.—ESTIMATED AVERAGE PRICES OF CORN RECEIVED BY PRODUCERS IN THE UNITED STATES, MONTHLY, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*

(Cents per bushel)

Crop year	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Weighted average
1909-10...	60.0	60.1	63.8	65.6	65.7	64.5	64.4	65.7	66.7	66.8	63.7	56.8	63.2
1910-11...	50.3	48.1	48.6	49.0	49.3	50.8	53.4	57.6	62.9	65.8	65.8	65.2	53.5
1911-12...	63.2	62.0	63.4	65.6	68.8	75.2	81.0	81.8	80.2	78.4	73.9	64.3	68.8
1912-13...	53.6	48.8	49.8	51.4	53.0	55.2	58.7	61.9	64.3	70.4	75.4	73.0	56.7
1913-14...	69.9	69.4	69.0	68.7	69.9	71.4	73.6	75.2	76.2	79.2	79.8	74.4	71.8
1921-22...	41.7	42.8	44.6	50.3	55.8	58.3	60.6	61.9	63.3	63.6	62.2	62.2	54.3
1922-23...	64.3	67.6	70.2	72.5	75.3	79.6	84.0	85.8	87.0	87.0	86.2	84.8	76.7
1923-24...	78.3	72.2	73.6	76.5	77.2	78.2	78.6	80.8	98.3	107.4	109.7	108.9	84.0
1924-25...	99.6	105.6	112.0	114.5	112.1	103.8	107.5	111.0	104.4	106.5	98.8	83.0	105.8
1925-26...	74.6	70.7	69.6	68.5	66.6	65.7	67.1	68.6	71.5	79.5	76.2	74.5	71.0
1926-27...	66.0	64.5	64.3	66.5	65.2	65.6	73.0	88.9	92.4	97.7	95.3	87.6	74.9
1927-28...	73.7	75.1	75.2	79.0	86.2	91.9	102.5	102.2	102.4	98.2	95.1	84.7	85.2
1928-29...	75.4	76.1	80.2	86.8	88.7	87.5	86.2	86.9	91.2	95.9	97.2	91.9	85.0
1929-30...	81.0	78.0	77.3	77.4	74.5	78.3	77.7	79.0	77.1	90.0	91.7	81.9	79.8
1930-31...	66.3	64.9	61.7	58.6	57.5	57.7	56.3	53.8	54.0	50.8	43.2	33.4	54.9 ^a

* Data from *Agriculture Yearbook, 1931, p. 625, and Crops and Markets*. Based on returns from special price reporters. Monthly prices weighted by production of corn for each state; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on first of month and first of succeeding month, November 1909-December 1923.

^a Arithmetic average; weighted average not yet available.

TABLE XXIV.—ESTIMATED AVERAGE PRICES OF HOGS RECEIVED BY PRODUCERS IN THE UNITED STATES, MONTHLY, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*

(Dollars per hundred pounds)

Crop year	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Weighted average
1909-10...	....	....	7.76	7.87	8.93	9.26	8.59	8.46	8.15	7.78	8.27	8.08	8.32 ^a
1910-11...	7.61	7.16	7.44	7.04	6.74	6.17	5.72	5.66	5.92	6.54	6.53	6.09	6.61
1911-12...	5.86	5.72	5.74	5.79	5.94	6.78	6.79	6.65	6.64	7.11	7.47	7.70	6.43
1912-13...	7.05	6.89	6.77	7.17	7.62	7.94	7.45	7.61	7.81	7.79	7.68	7.60	7.39
1913-14...	7.33	7.16	7.45	7.75	7.80	7.80	7.60	7.43	7.72	8.11	8.11	7.43	7.60
1921-22...	6.66	6.52	6.89	8.24	9.08	8.83	9.05	9.11	9.12	8.54	8.23	8.33	8.10
1922-23...	7.78	7.63	7.77	7.65	7.52	7.45	7.13	6.37	6.68	6.85	7.81	7.23	7.34
1923-24...	6.66	6.39	6.59	6.54	6.63	6.70	6.68	6.55	6.60	8.54	8.50	9.45	7.06
1924-25...	8.62	8.39	9.31	9.62	11.83	11.64	10.78	10.82	12.02	12.19	11.50	11.16	10.46
1925-26...	10.66	10.51	10.99	11.76	11.65	11.49	11.97	12.80	12.69	11.66	12.07	12.06	11.63
1926-27...	11.45	10.97	10.97	11.19	10.89	10.41	9.41	8.40	8.58	9.24	9.78	10.16	10.21
1927-28...	8.99	8.14	7.81	7.62	7.48	7.75	8.82	8.70	9.64	10.01	11.17	9.55	8.67
1928-29...	8.51	7.93	8.18	8.88	10.00	10.20	9.96	9.80	10.33	10.28	9.53	9.10	9.27
1929-30...	8.54	8.53	8.80	9.48	9.57	9.17	8.99	9.10	8.38	8.51	9.44	8.79	8.93
1930-31...	8.20	7.44	7.25	6.81	6.92	6.92	6.35	5.70	6.20	6.25	5.44	4.70	6.60

* Data from *Agriculture Yearbooks*, 1928, p. 930, 1930, p. 853, and 1931, p. 850; and *Crops and Markets*. Based on returns from special price reporters. Monthly prices weighted by number of hogs January 1, by states; yearly price obtained by weighting monthly prices by federally inspected slaughter.

^a Arithmetic average, 10 months only.

TABLE XXV.—CORN AND HOG RATIOS, BASED ON FARM PRICES OF CORN AND HOGS IN THE UNITED STATES, MONTHLY, 1909-10 TO 1913-14 AND 1921-22 TO 1930-31*
(Bushels)

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
1909-10...	....	....	12.2	12.0	13.6	14.4	13.3	12.9	12.2	11.7	13.0	14.2	13.0
1910-11....	15.1	14.9	15.3	14.4	13.7	12.1	10.7	9.8	9.4	9.9	9.9	9.3	12.0
1911-12....	9.3	9.3	9.1	8.8	8.6	9.0	8.4	8.1	8.3	9.1	10.1	12.0	9.2
1912-13....	13.2	14.1	13.6	13.9	14.4	14.4	12.7	12.3	12.1	11.1	10.2	10.4	12.7
1913-14....	10.5	10.3	10.8	11.3	11.2	10.9	10.3	9.9	10.1	10.3	10.2	10.0	10.5
1921-22....	16.0	15.2	15.4	16.5	15.8	15.7	15.0	14.7	14.7	13.7	13.4	13.4	15.0
1922-23....	12.8	11.7	11.1	10.9	10.2	9.8	8.8	7.9	7.5	7.7	8.5	8.8	9.6
1923-24....	8.2	9.0	9.0	8.5	8.6	8.6	8.5	8.1	6.7	8.0	7.7	8.7	8.3
1924-25....	8.7	7.9	8.3	8.4	10.6	11.2	10.0	9.7	11.5	11.4	11.6	13.4	10.2
1925-26....	14.3	14.9	15.8	17.2	17.5	17.5	17.8	18.7	17.7	14.7	15.8	16.2	16.5
1926-27....	17.3	17.0	17.1	16.8	16.7	15.9	12.9	9.4	9.3	9.5	10.3	11.6	13.7
1927-28....	12.2	10.8	10.3	9.6	8.7	8.4	8.6	8.5	9.4	10.2	11.7	11.3	10.0
1928-29....	11.3	10.4	10.2	10.2	11.3	11.7	11.6	11.3	11.3	10.7	9.8	9.9	10.8
1929-30....	10.5	10.9	11.4	12.2	12.8	11.7	11.6	11.5	10.9	9.5	10.3	10.7	11.2
1930-31....	12.4	11.5	11.8	11.6	12.0	12.0	11.3	10.6	11.5	12.3	12.6	14.1	12.0

* Data from *Crops and Markets*, September 1931, VIII, 364. The ratios represent the number of bushels of corn required to buy 100 pounds of live hogs, based on averages of farm prices of corn and hogs for the month.

APPENDIX B¹

OLEOMARGARINE FORMULA CONTAINING ANIMAL FATS

450 pounds oleo oil, at 8.87½ cents.....	\$ 39.94
350 pounds neutral lard, at 11.75 cents....	41.13
100 pounds cottonseed oil, at 7.10 cents....	7.10
100 pounds palm oil, at 8.50 cents.....	8.50
300 pounds milk, at 2 cents.....	6.00
35 pounds salt, at 1 cent.....	.35
	\$103.02

When churned, this will produce about 1,150 pounds of finished product. $\$103.02 \div 1,150 = 9$ cents per pound cost of materials for 1 pound of oleomargarine.

OLEOMARGARINE FORMULA CONTAINING VEGETABLE OILS

800 pounds coconut oil, at 6.50 cents.....	\$52.00
100 pounds peanut oil, at 12 cents.....	12.00
100 pounds palm oil, at 8.50 cents.....	8.50
300 pounds milk, at 2 cents.....	6.00
35 pounds salt, at 1 cent.....	.35
	\$78.85

When churned, this will produce about 1,150 pounds of finished product. $\$78.85 \div 1,150 = 6.8$ cents per pound cost of raw materials for 1 pound of vegetable oil oleomargarine.

¹ Hearing [on H.R. 15934] before the Committee on Agriculture, House of Representatives, *Oleomargarine*, 71st Congress, 3d Session, January 21, 22, and 23, 1931, Serial T, Part 1, pp. 9-10.

APPENDIX C

With respect to the relations of protein and fat in the bodies of hogs of different weights, we do not possess a large amount of analytical material covering all weights. What we do possess, however, is supported by data based on other animals. Perhaps the best material is that reported by Swanson and recomputed by Armsby. In the series of hog bodies analyzed were fifteen hogs whose empty weight varied from 156.86 pounds up to 389.26 pounds. These hogs had not been fed exactly alike, but the error thus introduced into the composition of the bodies was probably not notable. These fifteen animals may be divided into series of three, giving us five groups of ascending weights, the averages tending to reduce individual variations. The average empty body weight, the content of protein, and the content of fat, as recomputed from the table in Armsby and Moulton,¹ are shown in tabular form on page 634.

As the body weight increases, the percentage of protein declines and that of fat rises. As the body weight increases, the absolute amount of protein rises slowly and slightly; the absolute amount of fat rises rapidly and markedly. This is clearly shown in Chart 20 (p. 635). Apparently, a time comes in the growth of the body weight when protein becomes constant and all further increase would be fat and water. The interpretation of these data from the standpoint of joint-product interpretation of hog raising is obvious.

With respect to the conversion ratio of corn into hogs, it will serve our purpose to make a general statement drawn from the literature on the subject of the feeding of corn to hogs under controlled conditions. The reported recovery of the calories of the ration, in terms of calories in edible hog products, runs from 20 to 45 per cent under different circumstances. A 45 per cent recovery would be exceptionally efficient; a 20 per cent recovery would not be exceptionally inefficient. Converting these into No. 3 corn of average value represents a range of from 6 to 14 bushels of corn per hundredweight of live hogs. A great many factors modify the efficiency of production of hog flesh from corn. Among these are the breed and strain of hogs, the age at which feeding is begun, the age at which finishing is terminated,

¹ H. P. Armsby and C. R. Moulton, *The Animal as a Converter of Matter and Energy* (New York, 1925), pp. 46-47. In Paul Eltzbacher's *Die deutsche Volksernahrung und der englische Aushungerungsplan* (Braunschweig, 1915), p. 115, the average hog of 265 pounds was given an average protein content of 29 pounds and fat content of 140 pounds.

Hog number	Empty weight of hog (pounds)	Protein content (pounds)	Percentage of protein	Fat content (pounds)	Percentage of fat
1.....	156.86	20.42	13.02	63.43	40.44
2.....	159.35	19.44	12.20	61.43	38.55
3.....	180.99	19.82	10.95	94.68	52.31
Average.....	165.73	19.89	.....	73.18	.....
4.....	192.20	23.64	12.30	84.95	44.20
5.....	195.66	23.54	12.03	79.67	40.72
6.....	199.71	25.34	12.69	81.56	40.84
Average.....	195.86	24.17	.....	82.06	.....
7.....	209.95	22.70	10.81	107.52	51.21
8.....	211.22	26.72	12.65	98.66	46.71
9.....	245.15	27.78	11.33	113.50	46.30
Average.....	222.11	25.73	.....	106.56	.....
10.....	282.58	26.22	9.28	134.59	47.63
11.....	318.93	33.07	10.37	167.18	52.42
12.....	364.52	30.33	8.32	206.87	56.75
Average.....	322.01	29.87	.....	169.55	.....
13.....	366.42	36.17	9.87	195.89	53.46
14.....	378.20	34.87	9.22	223.44	59.08
15.....	389.26	33.13	8.51	239.51	61.53
Average.....	377.96	34.72	.....	219.61	.....

the length of the feeding period, the body weight, and the components of the ration outside of corn. Corn is low in protein and the protein is deficient in essential amino acid; thus the recovery of flesh from corn is much enhanced by the use of appropriate supplementary protein and mineral mixtures. When swine are fattened by hogging down a corn field or are fed nothing but corn in a feeding yard, the efficiency is inevitably low; yet this is a widespread practice in the corn belt. The available experimental data suggest that, under comparable conditions of feeding with balanced rations, following a two months' suckling there is a steady increase in the efficiency of conversion up to a certain age and weight, which is probably little over 200 pounds, beyond which the rate of returns tends to decline.

This inference from the experimental data has the support of physiological theory. The point is of importance, since under comparable conditions a three months' fattening of feeder pigs

beginning at the sixth month would give better results than a three months' fattening of feeder pigs beginning at the ninth month. Few finishers approach the best experimental result, 6 bushels to the hundredweight of live hogs. In some feeding experiments made by J. M. Evvard (cf. *Wallaces' Farmer*, January 13, 1928, p. 4), the hundredweight of live hogs was secured from 292 pounds of corn supplemented with 48 pounds of protein and mineral elements including hardwood ashes, lime, iron, and iodine. Probably the majority of farmers marketing gilts and barrows under one year of age have put in between 9 and 11 bushels of No. 3 corn of average composition to build the hundredweight of live hog, instead of less than five, in the experiment quoted above.

CHART 20.—CONTENT OF FAT, PROTEIN, AND OTHER COMPONENTS IN HOGS OF VARYING EMPTY WEIGHTS*

(Pounds)



* Based on data in table on p. 634.

APPENDIX D

To illustrate the influence on demand for corn to be expected from increase in efficiency in the use of corn in swine husbandry, a simple computation suffices with the use of several stated assumptions. Let 10-year averages be employed. The annual average crop of corn in 1921-30 was 2,723 million bushels. The annual average of the total estimated slaughter of hogs during the same period was 71,579 thousand. The average live weight at Chicago over the period was 241 pounds. Let us assume that the Chicago weight was representative of the weight at other terminals, and that animals slaughtered outside of federal inspection had the same weight as those slaughtered under federal inspection. In the 1921 *Agriculture Yearbook* it was estimated that 40 per cent of the corn crop was fed to hogs on farms. More recent estimates indicate that a larger proportion of the corn crop goes to hogs, and the hogs outside of farms must be taken into account. Let us assume that 48 per cent of the average corn crop went to the hogs of the country. Since the predicated total slaughter of hogs at the predicated average live weight yielded about 172.5 million hundredweight of hogs for slaughter, when this figure is related to the predicated amount of corn going to hogs, it follows that on the average each hundredweight of hogs at slaughter corresponded to 7.6 bushels of corn.

This figure has a different meaning from that of the conversion ratio in the corn belt, since it is a country-wide estimate. West of the Rocky Mountains hogs receive almost no corn; otherwise, outside of the corn belt, hogs receive corn to varying extents. In the corn belt the breeding stock receives less corn than the stock being finished; for hogs being finished, other grains are used in partial substitution for corn, legumes find increasing use, and supplementary protein rations reduce the use of corn. With all qualifications applied, it follows that during the past decade the hundredweight of market hogs has corresponded to something like 7.6 bushels of corn; or probably the range 7-8 is preferable.

As small grains, legumes, and other feeding stuffs are more and more used in feeding hogs, the demand for corn declines. As light hogs and protein content claim premiums over heavy hogs and fat content, the demand for corn declines. If, now, during the next five or ten years, with domestic requirements for hog products constant, the cumulative result of improvement in breeding, management, and feeding of hogs were to correspond to half a bushel of corn per hundredweight of hogs, this would represent a loss of demand of something close to 100 million bushels of corn.

Corresponding calculations could be applied to cattle, sheep, and poultry. Finally, the effect of decline in number of work animals on demand for corn must be taken into consideration. According to the 1921 *Agriculture Yearbook*, horses and mules on farms consumed 20 per cent of the average crop, equivalent to something like 22 bushels per head per annum. This figure is too low for horses in towns and cities, but the point may be disregarded. From 1920 to 1930 the count of work animals on farms in the United States declined at the rate of about 650 thousand per year. Decline will continue. If for illustration we assume that in the next five years the count of horses and mules is reduced by 3 million, this would represent a reduction in demand of corn of something over 60 million bushels.

In short, it is reasonable to suggest that within the next decade the domestic demand for corn to be used by animals for domestic purposes may be reduced by more than 200 million bushels. Looking back over the reduction during the decade since the war leads one to infer that something like the foregoing estimate is what the corn belt must be prepared for.

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