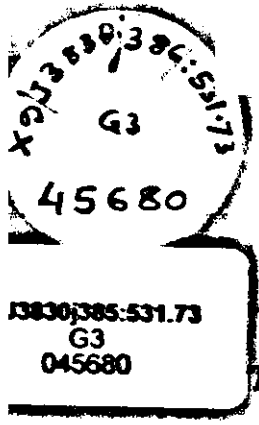
Agricultural Tariffs

# The Tariffs on Barley, Oats and Corn

*Theodore W. Schultz*

*Edited by*

J. R. Commons, B. H. Hibbard
W. A. Morton

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# The Tariffs on Barley Oats and Corn

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# THE TARIFFS ON BARLEY OATS AND CORN

*by*

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Madison, Wisconsin

1933

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# EDITORS' INTRODUCTION

The tariffs on the course feed grains—barley, oats and corn, are excellent examples of purely nominal duties. They are practically without effect on the prices of these products. While the tariff on sugar is fully effective because we import half of our supply, and the tariff on dairy products is partially effective because we are on the borderline between an import and an export basis, the tariff on these grains is without constant or significant effect, because they are indirectly and directly on an export basis.

The small exports of feed grains in their original form, generally much less than 10 per cent of our production, are supplemented by relatively larger exports in the form of pork products. Inasmuch as the feed grains are used primarily for the production of meat, poultry and milk, their value is largely determined by the prices of these commodities. Since hogs are the chief consumers of feed grains, the relationship between grain and meat prices is not mathematically precise, but it can readily be seen that cheap meat means cheap grain, while high meat prices accompany high grain prices. In general meat prices govern grain prices though temporarily the relationship may be at least partially reversed. In the long run, therefore, the tariff on the feed grains can be effective only insofar as the price of meat products, especially pork, can be maintained above the world level. On the whole, thus far, this has not been achieved.

While the ineffectiveness of the tariffs on most Corn Belt products has always been recognized by economists, it seems that propagandists have succeeded in convincing the farmers that these duties are of great benefit to them. Recently, for instance, a representative from Nebraska, discussing the tariff bill, said, "The district I represent is an area of the best part of the American Corn Belt . . . . If this bill favors agriculture, it will favor Nebraska. With its passage practically every product of the Corn Belt will be protected",[1] on the other hand, some of the opponents of the bill called these duties "paper rates", "nominal rates", "useless duties", "quack duties", "gesture duties", "fake rates", "political breadpills", and other similar epithets. While some legislators appear to have been deluded about these rates, others, although personally aware that rates on exported commodities

[1] *Congressional Record*, September 19, 1929, pp. 3683-84.

were valueless, nevertheless were apprehensive about the effect upon their own political fate should they publicly proclaim that fact. In view of the popular belief in the tariff, they hesitated to criticize these duties lest it be believed that they were opposed to the best interests of their own constituents. Some representatives, however, in urging higher duties did so in the hope that the Export Debenture could be attached to the tariff bill, or enacted at a later date. Since it was hoped this would make the tariff effective on these export commodities, it was felt that the higher the rates could be put, the greater would be the benefits to be derived from the Debenture, if and when it could be enacted.

The prices of the feed grains are interdependent. As feeds they are interchangeable, and they consequently bear a fairly constant price relationship to one another, rising and falling together. This is illustrated by Professor Schultz's Table 6. The major determinants of corn prices are, (1) the size of the corn crop, (2) the quality, (3) the number of hogs and their price, and (4) the size of the oat and barley crops. The major barometer of feed grain prices is the price of corn, and from the demand side one of the limiting factors in corn prices is the price of hogs and pork. So long as the latter are on an export basis, there is little hope that the tariff on corn or the other feed grains will be of any considerable value to the farmer.

*Barley.* Barley is grown chiefly for feed in the North Central States, Minnesota, North and South Dakota and Wisconsin; and in California for sale to English buyers for malting purposes. About two-thirds of the barley produced is used as feed for meat and dairy animals on farms where it is grown. The other third enters the channels of trade, and of this only about a third, is exported. Minneapolis is the principal barley market. Shipments from the barley producing regions are assembled there and at several other centers and then sent on their way East to deficit feed areas. Since the deficit area is in the eastern part of the United States, the barley moves by lake routes to Buffalo or Montreal, from which points it is either distributed locally to satisfy domestic needs, or exported. These exports are, however, sporadic, while those of California have been rather consistent.

Recently some hope has been entertained that a revival of the malting industry would be of great benefit to the farmers. Such a revival would, however, probably result in a distinction between

malting and feed barleys. The price of feed barley would probably be affected very little, though the prospective demand for malting barley would tend to raise the price of the better grades. The advent of prohibition caused the direct per capita consumption of barley to decline from 21 to 6 pounds per year. In 1917, 42 per cent of the crop was used for the production of alcohol and fermented liquors, while in 1931 only 3 per cent was so used.

The statistical analysis made by Professor Schultz bears out the previous observations that except for some extraordinary circumstances (see Chapter V) the tariff has been, aside from isolated instances, without value in raising Minneapolis above Winnipeg prices. At some times Winnipeg prices have actually been above those at Minneapolis. It is quite likely that the duty on barley will remain largely ineffective on the bulk of the crop, even though a considerable quantity is used to make fermented liquors.

*Oats.* The present duty of 16 cents per bushel on oats is without value to the farmer. Despite the decreasing use of oats as feed for horses, oat production has held close to its peak acreage. This is largely because climatic and economic conditions are not the determining factors in oat production. Oats have a place in the crop rotation in Corn Belt farms. Since they are extremely bulky, they cannot be shipped long distances; nevertheless, in recent years about 25 per cent of United States production was shipped out of the county where grown. Since oats are largely consumed locally, the American crop competes with the Canadian only in the eastern part of the United States. The grain moves from west to east along much the same lines as barley. As in barley, the North Central States constitutes the surplus area, the eastern states the deficit area. Oat production is nominally on an export basis, although only about one per cent of the crop is actually sold abroad, and the price depends almost entirely on domestic factors.

A statistical test of the effects of the oat tariff is not as readily made as it is in other products whose value is determined in fluid markets by national conditions. Local surpluses and scarcities may create purely local prices, which our organized markets do not entirely overcome. The closest approximation to national markets may be found in Minneapolis, Chicago, and Buffalo, and in Winnipeg and Toronto in Canada. A comparison of these prices shows that, except in unusual circumstances, the tariff on oats will probably continue to be without effect. Canadian prices have been sometimes lower, sometimes higher than American prices.

*Corn.* Although it is well known by economists that the tariff on corn has been practically without effect, it has been progressively raised until it is now 25 cents per bushel. These raises have been sought because it is argued that Argentine costs of production are lower than ours. Nevertheless, so long as corn remains on an export basis it must compete with foreign production whether or not it is "protected" by a United States duty.

The United States and Argentina are the only corn exporting countries of the western hemisphere. Although some Argentine corn is brought into the United States on the eastern and western seaboards, it does not furnish effective competition. In the Liverpool market American corn seems to sell at a higher price than Argentine corn. The Argentine crop is predominantly flint, while that of the United States is of the dent variety. About 84 per cent of our corn is used on the farm, and only about 15 per cent enters commercial channels. This corn is shipped to deficit areas in the South and along the Atlantic and Pacific seabords. Shipments, of course, originate in the Corn Belt, where in spite of the fact that this is an efficient area for hog production, a surplus of corn is available.

About one-half of the corn entering the markets originates in Illinois and Iowa, while nine states supply 87 per cent. Although only about one per cent of the crop is exported as grain, one of the major price determinants of the total crop is the price of hogs and pork, which are on an export basis.

The relation between corn and hog prices is known as the corn-hog ratio. This ratio consists of the number of bushels of corn required to equal in value 100 pounds of hogs. It is an expression of the relative value of corn as a grain or as a hog feed. For the last several years it has averaged 11.4 bushels at Chicago. Since the response of the corn producer and the hog feeder to this ratio is not perfect, for reasons discussed by Professor Schultz and others, the prices of corn and hogs can get out of line temporarily. Over a period of years, however, they cannot get so far out of line as to remove the price of hogs from its position as the fundamental factor in the price of corn and the other feed grains.

However, corn is used not only as livestock feed, but for human consumption and for the production of alcohol. Some people believe that import restrictions on blackstrap molasses, which is also used to make alcohol, will increase the demand for corn. As early as 1824 efforts were made to put a duty on West India rum, in the interest

of corn producers. This is similar to the attempt to raise the duty on the blackstrap molasses in the Smoot-Hawley bill. It appears, however, that even were it possible to compel the entire industrial alcohol industry to use domestic corn, instead of blackstrap molasses, in making alcohol, only 3 per cent of the crop would be absorbed. Blending gasoline with alcohol is an outlet now being considered. It would require a tax on gasoline and even higher tariffs on blackstrap molasses in order to work successfully. Even so, it is very doubtful whether these taxes would have any appreciable effect on corn prices. Furthermore, it is possible that those alcohol manufacturers who did not continue to use blackstrap molasses in spite of the duty would produce synthetic alcohol.

One of the limiting factors in raising the price of corn and the other feed grains above world levels is the one-eighth of our total hog products which are now exported. Lard, the most direct product of corn fed to animals, is strictly on an export basis, one-third of our production being sold abroad. These exports make the domestic price of the entire output of hogs, corn, and the other feed grains dependent upon the prices paid in the foreign markets. It appears, therefore, that so long as there are surpluses of meat products sold abroad the tariff on corn will continue to be without value to the American farmer.

*The Domestic Basis.*[2] Should, however, grains and meats cease to be sold in the export markets, the extent to which their prices could be raised within this country would depend largely upon the elasticity of demand of consumers for meat products. The Agricultural Adjustment Act of 1933 has for one of its purposes the reduction of production to a domestic basis. The tariffs on the feed grains and meats are an integral part of this program, for if it is hoped to raise domestic prices above world prices by restriction of production, a barrier must be put up against the foreign supply. The success of the crop restriction program as applied to grains and meat is, of course, uncertain. But even should it succeed it should not be forgotten that the ability to dispose of at home at higher prices whatever quantity of food is produced will still depend on the purchasing power of domestic consumers. So long as business continues to be depressed and unemployment still stalks the land, it will be difficult to raise prices to a level which appears satisfactory. To curtail production

[2] The views expressed here are those of the editors since the author did not discuss this question.

so greatly that only the higher income groups can afford meat is virtually impossible and clearly not desirable. To supply all of the domestic population with meat means that the price must remain quite low because the unemployed or partially employed and low income groups will be forced to curtail their purchases should prices rise beyond their reach. The butter tariff (See R. R. Renne, *The Tariff on Dairy Products.*) well illustrates the fact that prices can not be raised to profitable levels simply because a tariff protected commodity is on a domestic basis of production. The tariffs on barley, oats, and corn can not consequently be made effective, nor can the price of these grains be greatly raised simply by reducing or entirely eliminating exports, and restricting or prohibiting imports. Meat exports and imports may also disappear, but even with this done the prosperity of the Corn Belt farmer will still not be assured depending as it then would wholly upon domestic purchasing power.

JOHN R. COMMONS
BENJAMIN H. HIBBARD
WALTER A. MORTON

Madison, Wisconsin,
December 1, 1933.

## AUTHOR'S PREFACE

This volume deals with the tariff in its relation to the coarse feed grains—barley, oats and corn. It is divided into three parts, each of which is a complete monographic study of one of these grains. My first intention was to include all of the principal cereal crops grown in the United States, but it soon became evident that in order to do a thorough piece of work it would be necessary to limit the field. Wheat was omitted because of the study then under way at the Brookings Institute of Economics and those being published by the Food Research Institute. Flaxseed, rye and buckwheat were originally given some attention as is shown by the pamphlet on *Agricultural Tariffs* released in 1929[1]. For this study, however, I chose the feed grains for two reasons: (1) their importance to domestic agriculture, and (2) the lack of any previous research on them.

These three cereal crops are closely related, which makes it advantageous to deal with similar phases of each. In the main they are produced in the North Central states; the uses to which they are put are practically the same, and since national prohibition, which placed barley almost exclusively in the feed bracket, they have shown a very close price relationship. Corn clearly dominates the others in relative importance, whether measured by the price level, domestic supplies, or foreign trade. Barley, oats, and corn are important principally because they furnish the raw material upon which the gigantic livestock feeding industry of the large central area of the United States depends.

I have written for farmers, farm leaders, and men in public life who are interested in the influence of the tariff upon American agriculture. The bulletin is intended primarily for those farmers of the Corn Belt who desire to understand the tariff in terms of the basic production, marketing and price facts of their industry. Questions of tariff theory and method of verifying the effectiveness of tariffs have been avoided. It is an attempt to tell truly and clearly the relevant facts followed with concrete analysis and, in the end, to draw conclusions that are reasonable. To the tariff student it should be pointed out that this work contains all the important statistical data upon which my conclusions rest, and theoretical assumptions are easily inferred. This should facilitate critical appraisal by those readers conversant with the economic aspects of the tariff problem.

[1] Commons, John R., Hibbard, Benjamin H., and Perlman, Selig, *Agricultural Tariffs*, Freeport, 1929.

Part I, which takes up barley, breaks new ground virtually the entire way. Heretofore, for some reason, the economic phases of barley production, the disposition and movement of the crop, foreign trade, and the price characteristics of this grain have received little, if any, attention. In the section dealing with the malting industry I have tried to analyze the influence of the Eighteenth Amendment upon the demand for barley. This was necessary because the tariff on barley is inextricably connected with the demand for malting barley. In Part II oats are dealt with, and fortunately the materials needed were readily available. They required only to be brought together. Other investigators have covered the field of oat production and prices, so that it was possible to proceed directly to the tariff question with only a minimum discussion of the crop. In Part III, which deals with corn, a more elaborate treatment is given than in the case of the other two. The importance of corn—it exceeds both in acreage and value any other crop grown in the United States—justifies the emphasis. Students of corn and, particularly, hog prices, have made many valuable contributions to economic literature, and I have drawn freely upon these studies in order to get at the tariff issue. I have given special attention to the interdependence of corn and hogs, and have attempted to show its influence upon the long time general level of corn prices.

I wish to acknowledge the help and cooperation members of the Minneapolis, Milwaukee, and the Chicago Grain trades have given me and to thank Mr. W. T. Rawleigh for the financial assistance which make this study possible. My colleagues at Iowa State College have made available for me many valuable data, especially on corn. In these researches, I have had important assistance and criticism from Professor Walter A. Morton and Miss Jane Greverus. Professor B. H. Hibbard has unstintingly given his advice and invaluable criticism. To him especially I wish to express my gratitude.

Iowa State College

THEODORE W. SCHULTZ

December, 1933.

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# PART I BARLEY

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STRIKING changes have taken place in the barley industry within the past 15 years. The post-war readjustment of all cereal crops has been considerable, but barley seems to have fluctuated rather more than any other. Production has increased in spite of the lessened use of barley in beer-making since 1918. Had production decreased, it could and would have been attributed to the influence of the Eighteenth Amendment, but, since it has increased in favor among farmers, positive forces must be working to make it desirable. Chief of these are undoubtedly the high feeding value of barley, its possibilities of high yield, and the decline in the uses for oats.

The crop in the past five years has averaged about 290 million bushels. Production in 1919 dropped to its lowest point since 1904, and rose to a peak in 1928. Acreage has increased from 8 million acres in 1925 to over 13 million in 1929. Before the War, out of a production of about 200 million bushels, some 20 or 30 million bushels were exported; just prior to the depression production increased to over 300 million bushels and exports were twice as large as before the War. The United States is at present the leading barley producer of the world.

*Domestic Barley Areas.* The north central states constitute our main barley producing area; the two Dakotas, Minnesota, and Wisconsin grow half of the domestic crop. A second area, including western Kansas, Nebraska, Oklahoma, and northeastern Colorado is really an extension of the other, for it is controlled by the same general economic and physical conditions. In this study the entire Mississippi Valley will be treated as one general area. Another area, much smaller, but particularly important with respect to quality, is found on the Pacific Coast, principally in northern California.

Clearly California barley growers are beyond the pale of the tariff influence; this they apparently realize. They know that their barley is grown principally for the export trade, and have developed a specialized culture in response to the premiums paid by foreign

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ACREAGE, PRODUCTION, YIELD AND FARM PRICE TRENDS OF BARLEY

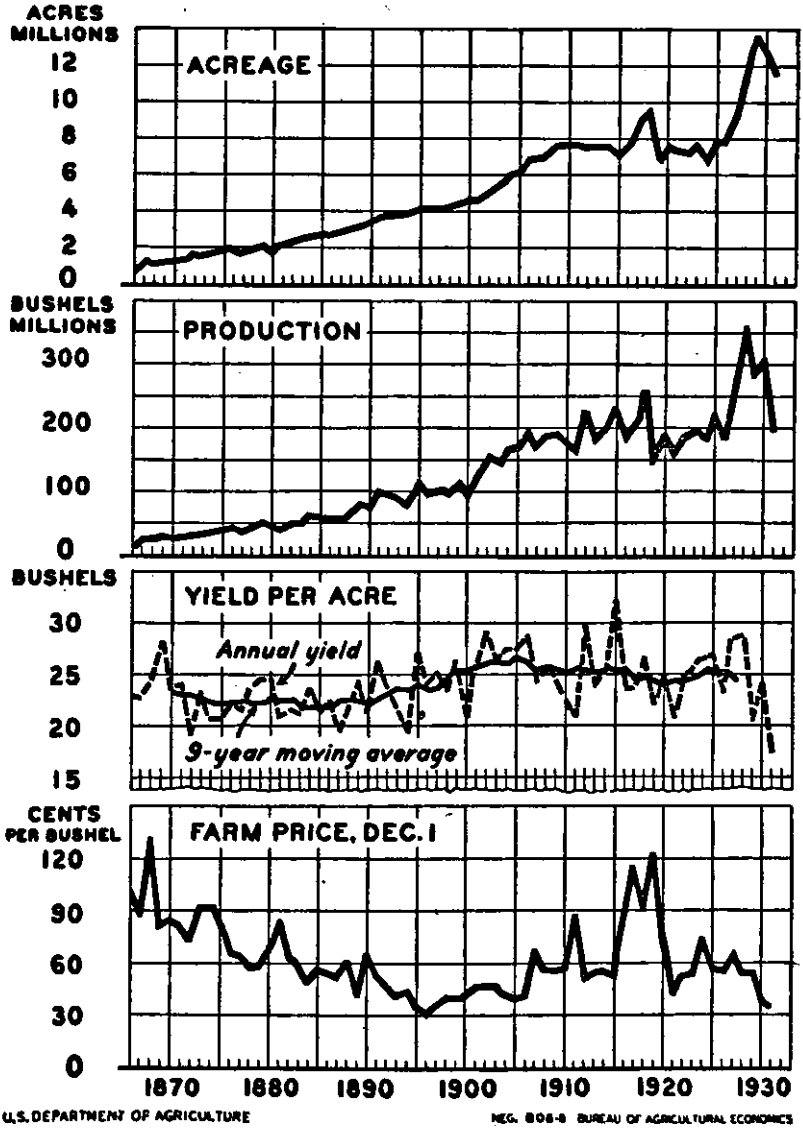


FIGURE 1. The secular trend of barley production reflects the notable expansion of the domestic agricultural plant following the Civil War, the apparent stability at about the time of the outbreak of the World War and the radical fluctuations since that time. Farm prices of barley indicate clearly the long-time variations in the value of the dollar.

buyers for good malting barley. The long rainless seasons of California and its relatively poor soil are both important in producing a low-protien malting barley, which is desired by European maltsters. Besides having low nitrogen content, California barley, due to low rainfall and lack of atmospheric humidity during the final stages of maturity, ripens and cures into a bright, clear-colored, and mellow-textured grain. It is frequently spoken of in the trade as "sun-cured" barley. Since California sells most of her barley to maltsters, and buys feed barley from other states for domestic use, we shall speak of it as the malting barley surplus area.

TABLE 1

UNITED STATES AVERAGE BARLEY PRODUCTION AND EXPORTS BY AREAS FOR FIVE-YEAR PERIODS, 1905-1930

(million bushels)

| | Malting Barley Surplus Area California | | | Feed Barley Surplus Area N. Dak., Minn.[3], | | |
|---|---|---|---|---|---|---|
| Period | Production[1] | Exports[2] | Percentage of crop exported | S. Dak., and Wisconsin production | Exports[4] | Percentage of crop exported |
| 1906-1910 | 33.4 | 5.9 | 18 | 87.9 | .6 | 1 |
| 1911-1915 | 39.4 | 8.8 | 22 | 104.5 | 7.2 | 7 |
| 1916-1920 | 32.4 | 11.9 | 37 | 97.3 | 11.4 | 12 |
| 1921-1925 | 28.9 | 13.3 | 46 | 88.3 | 8.0 | 9 |
| 1926-1930 | 31.3 | 10.2 | 32 | 144.2 | 20.2 | 14 |

*Sources:* [1] Compiled from *Reports of the California State Board of Agriculture* and from the U. S. Department of Agriculture, *Yearbook of Agriculture, 1931.*

[2] U. S. Department of Commerce, *Foreign Commerce and Navigation of the United States.* Figures for 1906 to 1917 are for the fiscal year beginning July 1; beginning with 1918 they are for calendar years. From 1917 through 1930 only those barley exports leaving San Francisco and Los Angeles were considered. Most of California barley exports are shipped from San Francisco.

[3] Based on estimates made by the U. S. Department of Agriculture. Taken from *Yearbook of Agriculture.*

[4] Taken from *Foreign Commerce and Navigation of the United States.* Total domestic exports of barley minus column "Exports Pacific Coast Ports".

In the Dakotas and Minnesota the crop ranks fourth in acreage among the cereals; in Wisconsin, where wheat is less important, it is third. In the north central states it is now grown, not primarily as a cash crop, but as a feed for livestock. For example, in North Dakota, which is to the north of the Corn Belt, farmers are turning to

barley as feed for their increasing livestock. In Wisconsin, also, it is finding an important place as feed in the farm program. Although relatively little barley is sold, the surplus competes in commercial channels with corn and oats, and sells at feed grain prices. At a later stage some of it is selected and diverted into the brewing and malting industries.

*Canadian Production.* Canada is our only likely competitor for the American market, and the tariff barrier is erected presumably to keep out the Canadian surplus. Should a general feed shortage occur, it is possible that barley prices might rise high enough to attract Argentine barley to the Atlantic and Pacific coasts, in which case California feeders might diminish their exports of malting barley or import the necessary feed. Such a result does not, however, appear likely, since there are no important feeding industries on either coast more favorably located for Argentine than Canadian grain. The coarse feed grains—corn, oats, and barley—of the United States are largely fed where they are grown. In other words, the feeding industries are found in the surplus feed areas, the North Central States.

[1] Comparatively little literature of an economic character has been published relative to barley culture in these four states. Apparently the popular belief that prohibition would decrease barley production has tended to discourage research in the field.

The following State Agricultural Experiment Station Bulletins treat principally of the physical phases of barley culture, although each has valuable economic information and interpretations.

Champlin, Manley, Morrison, J. D., and Martin, John, ***Barley Culture in South Dakota,*** South Dakota Exp. Station Bul. No. 183, 1919.

Ebling, Walter H., ***Wisconsin Agriculture,*** Co-operative Crop and Livestock Reporting Service, Madison, Wis., 1927, Bul. No. 90.

Harlan, H. N., Newman, L. H., and Martini, Mary L., ***Yield of Barley in the United States and Canada 1922-1926.*** U. S. Department of Agriculture Technical Bul. No. 96, 1929.

Hughes, H. S., and Burnett, L. C., ***Barley Growing,*** Agr. Exp. Station Circular No. 109, Iowa State College, 1928.

Klages, K. H., ***Barley Production in South Dakota,*** Agr. Exp. Station Bul. 256, South Dakota State College, 1930.

May, Ralph W., ***Oats and Barley in Central Montana,*** Montana Agr. Exp. Bul. 209, 1927.

Moore, R. A., and Leith, B. D., ***Barley in Wisconsin,*** Wisconsin Agr. Exp. Station Bul. No. 212, 1929.

Robertson, D. W., et al, ***Barley in Colorado,*** Colorado Agr. Exp. Station Bul. No. 371, 1930.

Stoa, T. E., ***Varietal Trials with Barley,*** North Dakota Agr. Exp. Station Bul. No. 184, 1924.

Wilson, James W., and Wright, Turner, ***Barley as a Fattening Feed for Cattle and Swine in South Dakota,*** Agr. Exp. Station Bul. No. 262, South Dakota State College, 1931.

Alberta, Saskatechewan, and Manitoba, the three Canadian provinces bordering Minnesota, North Dakota, and Montana, produce most of the Canadian barley. This, too, enters the trade as a feed grain, although a limited amount selected by sample is absorbed by the English brewing industry. Foreign buyers are as yet prejudiced against it, especially for brewing, because it is frequently dirty, badly colored, and mixed with weed seeds. Frost damages, which affect its germinating power, often make it unfit for malting. The Canadian crop is subject to economic and physical limitations similar to those operating in the feed barley area of the United States.

GEOGRAPHICAL LOCATION OF DOMESTIC BARLEY AREAS

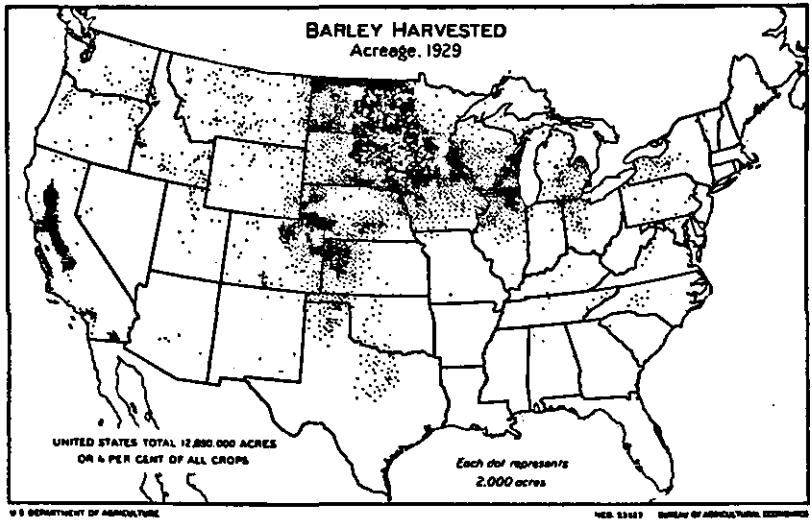


FIGURE 2. Domestic barley is the "corn of the North". Except in California, it is grown principally for feed purposes.

## WORLD PRODUCTION

Before the War, 1,400 million bushels of barley were considered a normal world crop. Russia, which dominated the world market, produced more than 25 per cent of the total, and supplied about 50 per cent of all the barley entering world trade. The surpluses of south central Russia, the Ukraine, entered export channels largely through the Black Sea ports and were absorbed by central Europe.

The trend of world barley output has been noticeably upward, even though Russian production is still below pre-war figures. The world crop in recent years has been around 1,850 million bushels, with Russia producing, not 25 per cent of the total as before the War, but less than 15 per cent. It is likely, however, that Russia will rapidly reclaim her former barley markets. Even now central Europe is buying the Russian and Roumanian surpluses to meet her demand for feed barley.[2] It seems likely that the Russian barley supply, again, will become important, and increasingly so, in the world trade.

TABLE 2

AVERAGE BARLEY PRODUCTION IN SELECTED COUNTRIES FOR THE FIVE YEARS 1926-27 to 1930-31

| Countries | Production (million bushels) |
|---|---|
| United States | 287 |
| Russia[a] | 258 |
| Germany | 132 |
| Canada | 115 |
| Spain | 94 |
| Roumania | 87 |
| Japan | 81 |

[a] Four-year average, 1926-27 to 1929-30.

*Source:* Compiled from statistics on grain, U. S. Department of Agriculture, *Yearbook of Agriculture, 1931.*

## Factors Affecting American Barley Production

The barley plant is well adapted to regions having cool summers; high humidity and high temperature deter its growth. Barley is truly the " Corn of the North"; most of the acreage is directly north of the Corn Belt. This area provides a well drained, although far from sandy-textured, soil. The expansion in western Nebraska, Kansas, Oklahoma, Texas, and eastern Colorado indicates that barley is also adaptable to semi-arid conditions.

*Early Maturity.* Since Barley matures quickly it can be seeded later than such spring grains as wheat and oats, thereby increasing the acreage which a farmer can operate. For this reason, and because the shorter growing season which it requires tends to keep down weeds,

[2] Michael, Louis G., *Agricultural Survey of Europe.* The Danube Basin, Part 2, "Roumania, Bulgaria, and Yugoslavia", U. S. Department of Agriculture, Technical Bulletin No. 126, 1929, pp. 50-52.

it is added to farm rotation, especially in the Dakotas, Minnesota, and Montana, where the spring is frequently late and the seeding time is of necessity limited. Also, barley will grow in soils which remain wet late in the spring, and on low lands which have been temporarily "drowned out". In the prairie country, particularly the Dakotas and the Prairie Provinces of Canada, the one-crop system characteristic of pioneer agriculture has allowed the soil to become heavily infested with weeds. Farmers use barley to combat the weeds, with the result that some of the barley marketed contains great quantities of weed seed, especially wild oats.

*Outyields Other Small Grains.* Under suitable conditions, such as prevail in the northern tier of states as far west as the Missouri River, barley produces more pounds of feed per acre than any other small grain. Experiment station records almost uniformly indicate that it far out-yields oats on this basis. In the central valley of California it has averaged higher returns per acre than either wheat or oats.

*Shift from Oats to Barley.* Oats are usually considered the ideal horse feed; but as the influx of tractors, automobiles, and trucks has reduced the number of horses and mules about a fourth since 1920, the demand for oats has consequently declined. It seems likely that this displacment will continue. In adjusting to the lessened demand for oats, farmers, especially in the Dakotas and Minnesota, have replaced oats with barley.

*A Desirable Nurse Crop.* As a nurse crop to aid the start of grass seed, barley is superior to oats, because of its early maturity and smaller leaf growth. A disadvantage, perhaps of minor importance, is the fact that barley harvesting and threshing, in the past have been disagreeable. Barbless varieties are much less disagreeable and yield well.

*Barley Scab Epidemic in 1928.* Barley scab has discouraged production in some sections. It occurs most frequently in the zone where barley and corn overlap, and does its greatest damage where the rotation is corn after corn, followed by barley without plowing the cornstalks under. The scab epidemic of 1928 affected the feeding properties of this cereal and caused much sickness when fed to hogs.[8]

[8] Dickson, James G., *Scab on Wheat and Barley and Its Control*, U. S. Department of Agriculture, Farmers Bulletin No. 1599, 1929.

Moore, R. A., and Leith, B. D., *Barley in Wisconsin*, Wisconsin Agr. Exp. Station Bulletin No. 212, 1929.

Barley scab in 1928 not only injured local feeders, but became for the first time a price factor considered by the trade. Buyers became quite conscious of infected grain after their experience with the record production of 1928. Most of the badly scabbed barley of that year originated in Ohio, Indiana, Michigan, and southern Wisconsin, and was unloaded upon the market early in the season. The trade absorbed it without discounting the scab element, and shipped much of it to European buyers, who soon began to protest, claiming that it was not fit for feed. This reaction was much emphasized in the trade.

*Prohibition Legislation.* Prohibition fundamentally changed the demand for barley. During the post-war period brewers and maltsters have not been the principal buyers. Its effects are sufficiently important to warrant separate treatment, especially since the barley tariff formerly turned essentially on the quality variations arising out of the malt barley demand. This aspect of the problem is discussed below.[4]

[4] See pages 20 to 22 and 40

## CHAPTER II

## MOVEMENTS OF THE DOMESTIC AND CANADIAN CROP

TO appreciate the intricate mechanism in which barley price factors, including the tariff, operate, it is necessary to understand the barley market. Back of the price structure, both at Winnipeg and Minneapolis, there are not only physical production factors, but also the established channels for moving the crop surplus from producer to ultimate consumer. The domestic and Canadian barley movements will be analyzed briefly in order to ascertain: (1) at what points it is reasonable to test for a tariff price differential, and (2) to what extent the actual flow of barley through commercial channels justifies the prevailing price differential.

The surplus from the Dakotas, Minnesota, and Wisconsin is shipped to the United States lake ports, while that of the Prairie Provinces of Canada moves eastward to the upper lake port of Fort William-Port Arthur. The barley which continues eastward goes via the Great Lakes to domestic and foreign destinations. Buffalo is the second division point of this movement, for here it divides into two streams, each of which terminates at the North Atlantic Seaboard. One of these is the all-water route through the Welland Canal, over Lake Ontario, and down the St. Lawrence River to Montreal and Quebec; the second moves by rail or water to New York, Baltimore, Philadelphia, and Boston. The final annual surplus is exported from these North Atlantic ports. Some western barley is consumed in the East, which tends to decrease the quantity of barley as the surplus stream flows from Buffalo through deficit feed areas in both the United States and Canada.

Nearly all barley exports from the Pacific West are shipped to the United Kingdom via San Francisco. The movement from the farms is short and direct.

*Movement from Farms.* An increasing proportion of the barley crop is being used on farms as feed. While before the War 60 per cent was sold for cash, now only 20 per cent leaves the county which produced it. This trend is most evident in Wisconsin, Minnesota, and the Dakotas. In twenty years the share of the Wisconsin crop leaving the farm where it originated has dropped from 60 to 8 per cent. Apparently, in the North Central states, barley, probably of necessity,

has become a feed crop. Furthermore, since acreage has expanded in recent years, we infer satisfactory adjustment.

Back of the decline in cash sales is the changed demand for barley. Since the Eighteenth Amendment only a small amount of the cereal has been made into malt or liquor. From 1902 to 1917 the annual consumption of barley for this purpose was about 21 pounds per capita; since then it has dropped abruptly to about six pounds per person.[1] The effect of the recent legalization of beer cannot as yet be ascertained. There can be, however, little doubt that it will increase the demand for select malting barley.

The commercial outlet for California barley was not materially affected by the passage of the amendment. Malt production never flourished on the Pacific Coast, although its barley had always been considered excellent for malting. Eastern maltsters seldom entered the California market, although due to the partial crop failure in the Mississippi Valley and eastern United States in 1911 they were forced to go to California and even to Canada. California barley continues to be grown as a cash crop and not as a feed grain. Prices in the San Francisco market are controlled primarily by the Liverpool price, which attracts exports to the United Kingdom. For the period 1920-1929, 65 per cent of the barley grown in California was shipped out of the county where produced.

*Principal Barley Markets.* Minneapolis, both because of its situation in the heart of the barley-producing region of the Dakotas and Minnesota, and because of its well established grain trade, has naturally become the leading market of the United States. Other markets, in the main, follow the price leadership of Minneapolis as it is the chief market in barley futures. The annual receipts of the 14 primary western grain centers for 1924-1928 were 68 million bushels of which 21 million bushels, or 30 per cent, were accredited to Minneapolis, which is a distributing rather than a processing or consuming point. In recent years Minneapolis receipts have been twice as large as those at Chicago. Shipments represent about 83 per cent of receipts. Barley from Minneapolis is consigned (1) to malting houses in Minnesota and Wisconsin and more distant points,

1 Baker, O. E., *Do We Need More Land?* U. S. Department of Agriculture, Bureau of Agricultural Economics. Address before Agric. Exp. Conference, University of Minnesota, St. Paul, Minnesota, December 13 and 14, 1929. Montgomery and Kardell's Domestic Commerce Series, No. 38. U. S. Department of Commerce, *Apparent Per Capita Consumption of Principal Foodstuffs in the United States,* gives the recent per capita barley consumption as about five pounds per year.

(2) to dairying or hog-feeding areas with local feed deficits, and (3) to Duluth for shipment over the Great Lakes for sale to eastern buyers or export to Europe.[2] The best single price representative of the

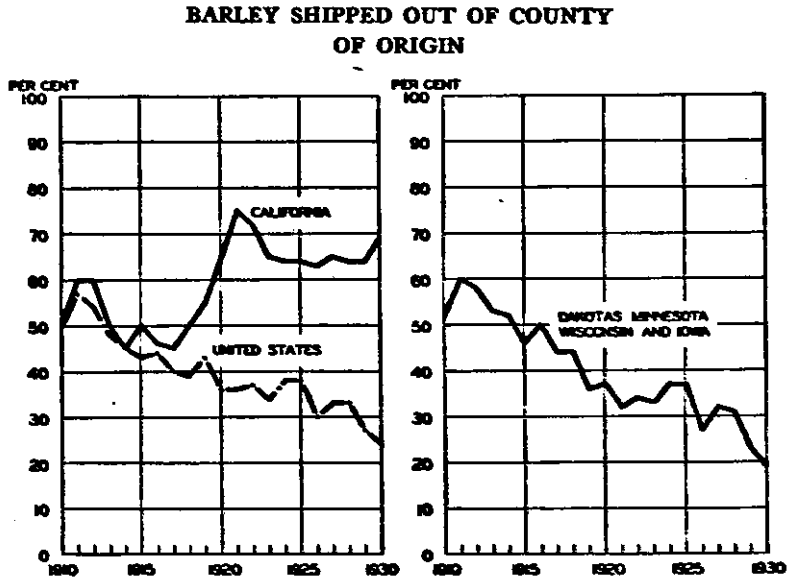


FIGURE 3. Since 1910 the proportion of the barley crop used upon the farm as feed has increased. For the United States, shipments out of county of origin declined from about 55 per cent to 25 per cent and for the North Central group of states from 60 per cent to 20 per cent. In California, however, the trend has been in the other direction.

domestic crop is found at Minneapolis, and this will, accordingly, be used to determine the influence of the tariff upon American and Canadian barley.

Measured by receipts Duluth, Chicago, and Milwaukee rank in the order given. The United States has in recent years exported large amounts of feed barley, an expanding trade up to and including 1928, which is reflected in the large receipts at Duluth. Grain is shipped eastward from all three of these ports; Duluth takes the crop from Minnesota, North Dakota, and Montana, while that of Wisconsin, South Dakota, southern Minnesota, Iowa, Nebraska, and Illinois generally goes to Milwaukee and Chicago.

[2] Mexican malting firms buy barley in Minneapolis and have it shipped south by rail.

*Seasonal Distribution of Barley Receipts.* Minneapolis, principally a distributing center, receives 67 per cent of its annual receipts from August to December, inclusive. Thence barley may be hurried on to Duluth, which is a highly seasonable market; virtually no barley arrives except in August, September, October, and November. This

TABLE 3

AVERAGE BARLEY RECEIPTS AND SHIPMENTS OF CHIEF MARKETS

(million bushels)

| Markets | Receipts[1] | Shipments[1] | Shipments as percentage of Receipts |
|---|---|---|---|
| Minneapolis | 21.0 | 17.6 | 84 |
| Duluth | 17.9 | 17.3 | 97 |
| Chicago | 11.5 | 3.9 | 34 |
| Milwaukee | 11.3 | 3.3 | 29 |
| 10 other Western Markets | 6.0 | | |

[1] Five-year average, 1924-1928.

*Sources:* Compiled from the Forty-Sixth Annual Report of the Minneapolis Chamber of Commerce, Minneapolis, Minn., 1928, p. 107.

unusual concentration in the fall months is due to the comparative cheapness of water as against rail shipping. Since December ice cuts off lake navigation, grain arriving at either Duluth or Fort William-Port Arthur is, if possible moved eastward before the ice season. After navigation ceases the grain must either be stored until the ice breaks, or shipped east by rail, which is relatively expensive. Consequently there is, every fall, a speeding up process, rushing American as well as Canadian barley to the upper Lake ports. More than one-third of the barley receipts at Duluth arrive during September.

Both Fort William-Port Arthur and Duluth are shipping points rather than grain markets. Particularly is this the case with the Canadian port, where the day-to-day grain prices are set in the Winnipeg Grain Exchange. All contracts made in the pit of the Winnipeg Grain Exchange are based upon the specified grain in store at Fort William-Port Arthur.

Milwaukee is neither a distributing market like Minneapolis nor a shipping port like Duluth or Fort William-Port Arthur. Over 70 per cent of the annual receipts at Milwaukee are used locally. Apparently this stabilizes the distribution of receipts, inasmuch as they are more constant than those of any other market.

The surpluses shipped eastward from the upper Mississippi Valley over the Great Lakes divide into three distinct courses, two of which terminate in Canadian ports and one in the United States. In all three they move through the same channels as the Canadian barley.

(1) Barley may go to the Georgian Bay Ports—Port McNicoll, Tiffin, Midland, Depot Harbor, and Collingwood,—and be distributed to interior points or forwarded to Montreal, which is about 400 miles by rail. Some of the shipments to Georgian Bay may eventually reach the Atlantic ports of the United States.

(2) It may be shipped over the Great Lakes for trans-shipment at Buffalo, whence it may be shipped to New York over the New York State Barge Canal and Hudson River, or move by rail to the Atlantic seaboard.

(3) Shipments east may also take the all-water route to Montreal. In this case they pass through transfer elevators at the foot of Lake Erie, though some go directly in small vessels from the head of the lakes to Montreal. The principal point of transfer from the large lake vessels to the smaller canal boats is Port Colborne. In the early fall, while the St. Lawrence River is navigable, grain is exported from Montreal and Quebec. When ice closes the river accumulated grain may be shipped for export to Halifax or St. John, or Portland, Maine.

## Movement of the Canadian Crop

There is a close similarity between the eastward movement of Canadian and United States barley. The surplus in each case moves eastward over the Great Lakes. The competitive inter-relationship existing between the Canadian and American barley will be indicated by a brief statement of the movement of the Canadian crop.

Production for the years 1925-26 to 1928-29 averaged 111 million bushels. The addition of carry-over and imports gives a total of nearly 117 million bushels available for distribution annually, of which 30 per cent is exported. For the four years mentioned the United Kingdom took more than 70 per cent of the exports.

*Movement of Barley for Western Division.* The western division includes Alberta, Saskatechewan, and Monitoba. From 1925-26 to 1928-29 the barley available there for distribution averaged 95 million bushels annually, including production, carry-over, and imports. Production in the western division is four times as large as

that of the rest of Canada. About 50 per cent of the shipments eastward was consigned to points in Canada, while the remainder was exported directly, leaving the Atlantic Seaboard through United States ports. About 40 per cent of the crop is sold for cash.

TABLE 4

FOUR-YEAR AVERAGE DISTRIBUTION OF CANADIAN BARLEY CROP
1925-26 to 1928-29.

| Classification | Million bushels | Per cent |
|---|---|---|
| TOTAL ANNUAL STOCK | 116.6 | 100 |
| Estimated grain fed on farms | 57.5 | 49 |
| Total exports | 34.9 | 30 |
| Used for seed and carry-over | 15.8 | 14 |
| Milled consumption, loss in cleaning grain not merchantable and other | 8.4 | 7 |

*Source:* Canada Dominion Bureau of Statistics, *Report of the Grain Trade of Canada.*

*Movement for Eastern Division.* The production of the eastern division for 1925-26 to 1928-29 averaged 20 million bushels. The barley concentration here, including production, shipments received from the western division, carryover, and imports, is 38 million bushels. Receipts from the western division were about as large as production; they averaged 16,300,000 bushels, of which all but 1,300,000 were re-exported.

TABLE 5

AVERAGE COMMERCIAL DISTRIBUTION OF WESTERN DIVISION (CANADA) BARLEY,
1925-26 to 1928-29

| Classification | Million bushels | Per cent |
|---|---|---|
| TOTAL | 36.5 | 100 |
| Exported | 16.3 | 45 |
| To Eastern Division | 19.9 | 54 |
| Milled Consumption | .3 | 1 |

*Source:* Canada Dominion Bureau of Statistics, *Report of the Grain Trade of Canada.*

For the four years 1920-21 to 1923-24, out of a total export of 50 million bushels, Canada shipped 42 per cent from United States ports. From 1924-25 to 1927-28 her total exports rose to 127 million bushels, and 62 per cent cleared through United States ports. The crop cleared through our ports crosses the principal feed deficit area of the United States, and it is here, and here alone, that the Canadian barley, whether in store or in transit, competes with domestic feeds.

## CHAPTER III

## EXPORTS, THE MALTING INDUSTRY, AND COMMERCIAL FEEDS

THE cash income from domestic barley is less than 60 million dollars of the total annual cash farm income. As it is essentially a feed grain, about two-thirds of the crop is consumed where it is grown; and although its cash value is relatively small, its farm value is important. Computed on the basis of December 1 prices, the farm value for 1925-1929 averaged $160,000,000. Whether cash farm income or farm value is used as a measure of the relative economic importance of barley in American agriculture, the fact that the crop is not widely grown increases its importance in the regions of concentration. In 1925 only 357,500, or less than 6 per cent of all farms, reported barley. The proportion in California is about 9 per cent.[1]

*Substitution: Competing Crops.* The fact that two-thirds of the barley grown is withheld from the grain markets to be converted into pork, beef, and eggs gives some idea of the intricate forces making barley prices. The interrelation of farm prices becomes apparent whenever one attempts to give statistical expression to a particular prime factor. The Dakota farmers may feed their barley to livestock or sell it at local elevators as feed grain, and their response depends upon a group of complex factors, of which the tariff, even when effective, is only one. For example, the value of barley is affected by the value of substitute feeds. It must compete with corn as a feed for hogs and dairy and beef cattle, with oats as feed for young stock and horses, and with wheat and cracked corn as a feed for poultry. The barley and corn production zones overlap in southern Wisconsin, Minnesota, and South Dakota, and in northern Illinois and Iowa. Here, in the northern fringe of the Corn Belt, barley grown upon the same farms as corn must compete in the economy of crop production as well as in the economy of livestock feeding.

*Interdependence of Barley and Other Grain Prices.* An analysis of barley price factors emphasizes the interrelationship of grain prices. The coarse feed grains (corn, oats, and barley) are interchangeable as feeds and, therefore, tend to bear relatively constant price ratios to one another. (See Table 6) The price of corn, the major feed grain,

[1] *Statistical Report of the California State Board of Agriculture,* Sacramento, California 1921 p. 180.

bears certain apparent relationships to the price of hogs, out of which has come what is known as the corn-hog ratio. The hog cycle, the exports of pork and lard, the increased rapidity in the turn-over in hog production, are all factors affecting hog prices. They, therefore, influence the farmer in his decision to sell his barley or feed it instead of corn to his hogs. In like manner, milk and butter prices influence the choice of the Wisconsin dairy farmer, beef prices the feeder of beef cattle in Iowa, and poultry prices the poultrymen of California. The dairymen of Wisconsin feed more than 90 per cent of their barley, while, at the other extreme, California farmers withhold less than 35 per cent of theirs.

TABLE 6

PRICES OF CORN, OATS, AND BARLEY FOR CROP YEARS 1922-23 TO 1930-31

| Crop Year[1] | Price per bushel | | | Cents per pound[2] | | | Relative price per pound 100=1.5 cents | | |
|---|---|---|---|---|---|---|---|---|---|
| | Corn[a] | Oats[b] | Barley[c] | Corn | Oats | Barley | Corn | Oats | Barley |
| 1922-23 | 73 | 41 | 58 | 1.3 | 1.3 | 1.2 | 87 | 87 | 80 |
| 1923-24 | 88 | 45 | 63 | 1.6 | 1.4 | 1.3 | 107 | 93 | 87 |
| 1924-25 | 106 | 50 | 84 | 1.9 | 1.6 | 1.8 | 127 | 107 | 120 |
| 1925-26 | 75 | 41 | 67 | 1.3 | 1.3 | 1.4 | 87 | 87 | 93 |
| 1926-27 | 87 | 43 | 71 | 1.6 | 1.3 | 1.5 | 107 | 87 | 100 |
| 1927-28 | 101 | 55 | 84 | 1.8 | 1.7 | 1.8 | 120 | 113 | 120 |
| 1928-29 | 92 | 44 | 65 | 1.6 | 1.4 | 1.4 | 107 | 93 | 93 |
| 1929-30 | 83 | 44 | 59 | 1.5 | 1.4 | 1.2 | 100 | 93 | 80 |
| 1930-31 | 60 | 35 | 47 | 1.1 | 1.1 | 1.0 | 73 | 73 | 67 |

[a] No. 3 Yellow Corn, weighted average price per bushel, Chicago.

[b] No. 3 White Oats, weighted average price per bushel, Chicago.

[c] No. 2 Barley, weighted average price per bushel, Minneapolis.

[1] Crop year ending: corn, October 31; oats, July 31; barley, July 31.

[2] Corn price divided by 56; oats, 32; barley, 48.

*Source:* Compiled from U. S. Department of Agriculture, *Yearbook of Agriculture, 1932.*

In general outline, we may consider the distribution of the barley crop in commercial channels as three-fold: first, that which enters the export trade; second, that absorbed by the malting and allied industries; and finally, a residual bought by domestic feeders. From 1923 to 1927 the barley in trade channels averaged about 72 million bushels annually, of which nearly 23 millions were exported, 20 millions used in the manufacture of malt, and the rest sold as feed.

## Exports

Only occasional reference has been made to the historical development of either the production or the movement of barley. Similarly, little will be said about foreign trade prior to 1900. It may be summarized as follows: the United States was definitely an importer prior to 1890; the tariff of 30 cents per bushel on barley and 45 cents per bushel on malt at that time decreased Canadian imports; and the period from 1890 to 1900 marks the turn from barley importation to exportation.

Even before 1900 exceptionally large exports occasionally occurred. In 1896 a large barley crop and the lowest December 1 prices on record (corn 21 and barley 30 cents per bushel) resulted in the export of 19 million bushels. In 1899 a similar combination moved 24 million bushels into foreign trade.

The brisk foreign demand of the World War increased the exports to 27 million bushels yearly in 1914-1918, approximately 13 per cent of production. Because of the wide fluctuations in both production and exports, the post-war readjustment period of 1919-

TABLE 7

AVERAGE UNITED STATES BARLEY EXPORTS BY COUNTRY OF DESTINATION, 1927-28 to 1930-31

| Destination | Million Bushels | Per cent of total |
|---|---|---|
| Total | 31.3 | 100 |
| Canada | 10.6 | 34 |
| United Kingdom | 10.3 | 33 |
| Germany | 6.6 | 21 |
| Netherlands | 1.7 | 5 |
| Belgium | 1.0 | 3 |
| Other | 1.1 | 4 |

1924 is omitted. From 1924 to 1927 exports regained a degree of stability, averaging nearly 30 million bushels annually, or about 14 per cent of production. The record crop of 347 million bushels in 1928 increased exports to 60 million bushels; on the other hand, in spite of the extraordinarily large crop of 1929, exports were less than the 1924-1927 average, and in 1930 only 10 million of the 265 million bushel crop entered international commerce.[2]

[2] Export figures are for the fiscal year beginning July 1 and are net balance figures including flour and malt.

*California Barley Exports.* Prior to 1914 the export trade did not absorb any large part of the California crop; between 1905 and 1909, 16 per cent entered foreign commerce. Since then Pacific Coast exports have increased sharply; in 1919, 1921, and 1924 more than half of the crop entered foreign trade. From 1926 to 1930, 32 per cent of the total crop was exported. The importance of the export trade becomes apparent in crop years like 1919-20, when European buyers showed such a strong preference for California barley that it became profitable for Pacific Coast grain dealers to export their barley and ship in eastern barley for feed.[3]

*Buyers of California Barley.* About three-fourths of the California exports are consigned to Great Britain. The remainder goes to continental Europe and China.

Twice since 1900 some California barley has been shipped east for domestic consumption. In 1901-02 over a million bushels were consigned from San Francisco for points east, and again in 1910-11 the acute shortage of good malting barley in the Mississippi Valley forced eastern brewers to buy barley in California. Some of this barley was shipped by rail to brewing centers in Minnesota and Wisconsin, and some by water around the Horn to North Atlantic ports.[4]

*Feed Barley Exports from North Central States.* Whereas barley exports from California have been, in recent years, fairly constant, the export surpluses originating in the Dakotas, Minnesota, and Wisconsin have enjoyed no such stability. Exports from this latter region have fluctuated from a half million bushels in 1923 to over 40 million bushels in 1928. In the last 15 years barley in the North Central states, whether measured by production, acreage, exports, or prices, has compassed a wider range than has any other farm crop. Since the War barley acreage in these four states has more than doubled, increasing from 3,200,000 to 6,600,000 acres. The 178 million bushel crop of 1928 in this area was a 200 per cent increase over the 59 million bushels of 1919.

The foreign barley trade is relatively less important in the North Central states than in California. Before 1911 less than one per cent of the production of these states was exported. Exceptional years were 1905 and 1912, when slightly less than 15 million and 11 million

3 U. S. Tariff Commission, *Agricultural Staples and the Tariff*, Tariff Information Series 20, 1920, p. 118, footnote.

4 From *Fourth Annual Statistical Report of the San Francisco Chamber of Commerce, 1914.*

bushels respectively entered the export trade. Since the War, however, the export trade has increased in importance. From 1924 to 1928 exports from custom districts other than San Francisco and Los Angeles averaged 20 million bushels annually. Assuming that they originated in the Dakotas, Minnesota, and Wisconsin, as most of them did, we may say that 15 per cent of the production of these states was sold abroad.[5]

TABLE 8

BARLEY CLEARED FOR EXPORTS VIA SELECTED CUSTOMS DISTRICTS, 1924-1928.

(million bushels)

| | Exports other than from San Francisco and Los Angeles | Exports, nine selected customs districts[a] | Per cent of total exported from selected customs districts |
|---|---|---|---|
| TOTAL | 100.9 | 88.0 | 87 |
| 1924 | 11.2 | 10.3 | 92 |
| 1925 | 17.2 | 16.8 | 98 |
| 1926 | 4.0 | 3.6 | 90 |
| 1927 | 25.7 | 23.4 | 91 |
| 1928 | 42 8 | 33.9 | 79 |
| AVERAGE | 20.2 | 17.6 | 87 |

[a] Includes Custom Districts Mass., Buffalo, N. Y., Philadelphia, Duluth-Superior, Wisc., Mich., Chicago, and Me.—N. H.

*Source:* U. S. Department of Commerce, ***Foreign Commerce and Navigation of the United States***

## IMPORTS

Barley imports have been negligible. In anticipation of the Fordney-McCumber Tariff Act, in 1922 nearly a million bushels were imported from Canada. Although this unusual shipment is listed in Canadian grain statistics as exports to the United States, the United States Department of Commerce estimates that only about 38,000 bushels of it were absorbed by our trade and consumed domestically. In the five crop years from 1923-24 to 1927-28 less than 40,000 bush-

[5] The heavy winter-kill of wheat in 1928 greatly increased the barley acreage that year in the Corn Belt states growing winter wheat. A considerable quantity of the barley exports that fall came from Ohio, Indiana, Michigan, Illinois, and Iowa. Much of this barley was badly scabbed, which, coupled with the break in barley prices, was responsible for the condemnation of American barley by European buyers, who had contracted for American barley at the earlier high prices and refused to accept the grain in fulfillment of their contracts. Because of the large crop in the East, barley surpluses from western Kansas and Nebraska and eastern Colorado were exported via New Orleans and Galveston.

els were imported annually from Canada. Most of this came through the customs district of Ontario. Noteworthy are the relatively large imports of 1930-31 stimulated by the activities of the Federal Farm Board.

## The Malting Industry

The Tariff on barley was originally enacted to protect the growers of malting barley. The object of the 30 cent per bushel duty in the tariff of 1890 was to stop the importation of high grade malting barley from eastern Canada, and this effort must be adjudged successful. These imports were strictly on a quality basis; Canada sold to domestic maltsters a barley of selected quality and at the same time bought feed—corn, oats and even barley—from the United States. The stoppage of imports forced the center of the malting industry from New York to Wisconsin.

The malting industry is significant in a study of the tariff because our former barley imports were on a quality basis, arising from the demand of maltsters. Prior to 1918 feed barley brought decidedly lower prices than malting barley. Most of the barley grown in the North Central States was produced for the malting trade; since the enactment of the Eighteenth Amendment, as already indicated, it has become essentially a feed crop. Although about 20 million bushels have been converted into malt annually, it has been obtained by sample selection at about feed barley prices, and as a result premiums paid for malting quality have been unimportant, except in crop years following an extensive crop failure such as occurred in 1931.

The significance of the change in the demand for barley attributed to prohibition has already been touched upon. It was shown that the average annual human consumption of barley fell from about 21 pounds per capita, for 1907 to 1917, to approximately 6 pounds per capita, for 1922 to 1927. A large part of the crop of the North Central States was used for the production of fermented and alcoholic liquors. For example, in 1917 this use alone absorbed 43 per cent of the preceeding crop; in contrast, in 1930 this proportion had dropped to 3 per cent, the marked increase in the size of the crop, of course, affecting the percentage figure. Nevertheless, historically at least, the flow and ebb of barley-growing has been closely interwoven with the rise and fall of the malting industry. Its recent revival again promises to influence the crop. Undoubtedly some farmers will shift from those varieties suitable only for feed to those that can be used for malt, but

the bulk of the crop will in all probability continue to be grown for feeding purposes and sell at feed prices.

TABLE 9

NUMBER OF MALT ESTABLISHMENTS AND BUSHELS OF BARLEY MALT PRODUCED IN 1927, BY STATES

| | Establishments | Production (million bushels) |
|---|---|---|
| UNITED STATES | 23 | 21.5 |
| Wisconsin | 8 | 9.8 |
| Illinois | 3 | 3.3 |
| New York | 4 | 3.0 |
| Other States | 8 | 5.4 |

*Source:* U. S. Department of Commerce, Bureau of Census, *Biennial Census of Manufactures, 1927,* Preliminary report issued June 30.

*Decline in Fermented Liquor.* Before prohibition legislation closed the doors of saloons and breweries, nearly all the barley manufactured into malt was consumed in fermented liquors. Barley and barley malt were the raw materials out of which the 1,700 breweries of pre-war days made 60 or more million barrels of liquor annually. The production of one barrel of liquor required 1.25 bushels of barley malt, 12 pounds of corn, and one pound of hops.[6]

TABLE 10

AVERAGE PRODUCTION OF FERMENTED LIQUOR IN THE UNITED STATES FOR FIVE-YEAR PERIODS FROM 1901 TO 1930

| Period | Million barrels |
|---|---|
| 1901-1905 | 45.9 |
| 1906-1910 | 57.6 |
| 1911-1915 | 63.4 |
| 1916-1920 | 41.3 |
| 1921-1925 | 6.2 |
| 1926-1930 | 4.2 |

*Source:* Compiled from U. S. Treasury Deparment, *Statistics Concerning Intoxicating Liquors,* December, 1930, Table 43.

According to the records of the Office of Internal Revenue, 78 million bushels of barley were converted in 1917; 60 million barrels of fermented liquor were produced, and in addition approximately 7 million bushels of barley were used in making alcohol. This represented 43 per cent of the 1916 crop, or 87 per cent of production in

[6] Computation figures employed by the U. S. Census, *Census of Selected Industries,* Vol. 3, 1900.

the Dakotas, Minnesota, and Wisconsin, the area where most of the malting barley was grown. Even though the 1917 figure is somewhat large, since the liquor production of that year was stimulated in anticipation of prohibition legislation, the influence of liquor on the demand for barley is evident.

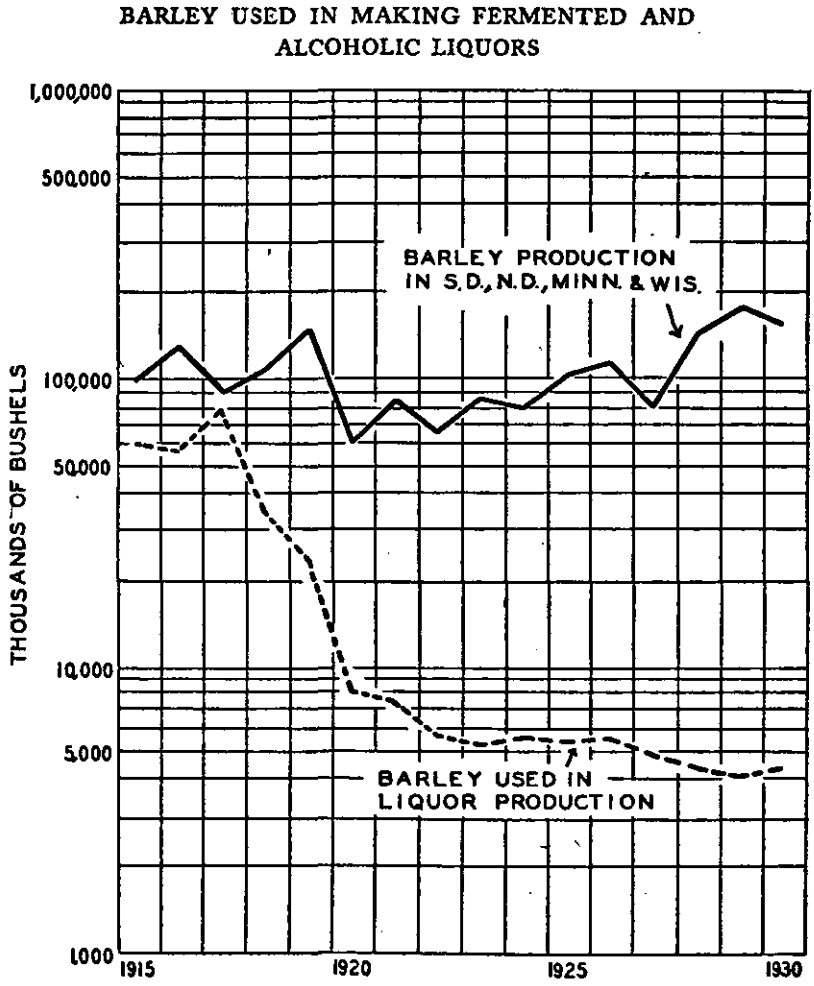


FIGURE 4. Historically the rise and fall, including the recent prospective revival of the barley industry, is closely related to the activity of domestic maltsters. This was particularly true for barley grown in the North Central group of states prior to national prohibition. In recent years, however, barley has found considerable favor as a feed. The bulk of the crop will, in all probability, continue to be absorbed as feed in spite of increased beer consumption.

*Malt Production Since Prohibition.* Barley malt has been consumed largely in the form of preparations and extracts, yeast, vinegar, and syrups. While less than five million bushels of barley have been employed annually in the production of beverages, about 15 million bushels have been absorbed in these other uses, which have in the main, developed since 1918.

From 1923-24 to 1928-29 an average of 17,635,000 bushels of barley malt entered trade channels annually, while, in addition, about five million bushels of malt were used for immediate conversion into manufactured foods. Exports averaged 3,700,000 bushels.[7] About 25 per cent of the malt produced was used in beverages; 16 per cent of the total was exported. Estimates obtained from maltsters indicate that between 10 and 15 per cent of the malt was made into foods, such as vinegar, yeast, and baking preparations of one kind or another. The remainder, nearly 50 per cent of the total, was made into malt syrup, which apparently was consumed in the form of home-made beverages.

*Exports of Malting Barley.* Practically all of the barley bought by maltsters is on the basis of sample selection. Barley varieties suitable for malting are not standardized, which makes trading difficult. Domestic barley ranges from a weedy, unclean feed to a mellow, plump, high class malting grain of good color and uniformity. Maltsters and brewers, especially abroad, are prejudiced against barley originating in the North Central States as well as that from the Prairie Provinces of Canada. The Canadians, however, are making strenuous efforts to develop a satisfactory grading system. Large quantities of excellent malting barley are at present used as feed because of market limitations and prejudice. Canadian growers may succeed in meeting the European buyers' requirements in barley as they have in wheat. This prejudice does not entirely bar American barley from the foreign malt trade. Some of our exports are specifically consigned to the foreign maltsters. English buyers, for example, at times leave standing orders at Milwaukee for barley suitable for malting. In general, however, upper Great Lakes barley is exported for feeding purposes, and goes chiefly to European countries as hog-feed.

[7] United States malt exports go principally to Canada, Mexico, Cuba, and Latin America. Canada has been the best customer for American barley malt, followed by Brazil, Mexico, and Cuba.

Outlets for barley aside from the production of malt are the manufacture of pearled and pot barley, barley flour, and breakfast foods, although the importance of any of these is negligible. A prohibitive tariff on these products could not conceivably influence the price of barley since they utilize only a small fraction of one per cent of the entire production.

## Domestic Trade in Feed Barley

The domestic trade in feed barley remains the largest established outlet. Its sources and terminals are statistically quite indeterminable; yet we know by deducting exports and malt consumption from the quantity entering the trade that most of it is used for feed.

In pre-war days, before the automobile, truck, and tractor had so diminished the number of horses employed, the important outlets for California barley were given in the following order: exports, horse feed, and feed for other animals. Today, with the decline in the number of horses and with the phenomenal development of poultry culture the order has become: exports, chicken feed, horse feed, and feed for other animals. In San Francisco for the period 1920-1929, out of the total of 133 million bushels of barley received, 110 million bushels were cleared for export. The remaining 23 billion bushels, or 17 per cent, was consumed domestically as feed.

Of the barley shipped east from Duluth, Milwaukee, and Chicago, 25 per cent was not exported. This means that a considerable amount of it was used in eastern United States either as feed or as malt. From 1924 to 1928, of the 118 million bushels shipped east, 88 million were exported. In other words, 30 million bushels, or slightly over six million bushels annually, were used in the deficit area of eastern United States.

Those grain commission companies which deal mainly in barley have, since prohibition legislation, endeavored to encourage the feeding of barley, and it has in many instances become a very important and desirable ingredient in the preparation of commercial feeds.[8]

[8] Several thousand copies, for example, of Professors Morrison and Bohstedt's study, ***Barley for Fattening Pigs***, describing "How it Compares in Value with Corn," "How to Prepare it for Feeding," and "What Feeds to Supplement it With," were mailed by Milwaukee grain firms to buyers of feed grain.

By and large, barley is a feed grain whether it is fed by the grower, exported, or shipped to deficit sections within the country. Two exceptions to this general statement must be made: California barley exports, and the 20 million bushels annually made into malt. Two-thirds of the entire crop remains upon the farm where grown. Of the 72 million bushels entering the trade about 23 million are exported, 20 million converted into malt, and the remainder used as feed.

## CHAPTER IV

## THE BARLEY TARIFF

IN 1883 the first barley tariff imposed a 10 cent per bushel duty on barley (48 pounds) and 20 cents per bushel on malt (34 pounds). Nevertheless, imports of malting barley from Quebec and Ontario increased. In 1890 the barley tariff was featured as protection to the farmers; the rate was raised to 30 cents on barley and 45 cents on malt, where it remained until 1913, except for the ad valorem rate of 30 per cent on barley and 40 per cent on malt from 1894 to 1897. In 1913 the barley duty was pared down to 15 cents and the malt duty to 25 cents per bushel. Since one bushel of barley yields approximately 1.12 bushels of malt, maltsters have enjoyed throughout a much higher margin of tariff protection. In 1883, it was 100 per cent greater; in 1890, 50 per cent; and in 1913, 66 per cent.

The Tariff Act of 1922 made barley dutiable at 20 cents per bushel and malt at 40 cents per hundred pounds. No change was made in 1930. Table 11 gives a complete summary of the duties in each of the tariff acts.

### Attitude of the Rural Press Toward the Barley Tariff

The only specific emphasis on protection for barley in the United States occurred in 1890, and even then the expressions appearing in editorial and readers' columns dealt more with certain broad fundamental principles than with the effect of the tariff upon particular commodities. Farmers writing to the *Rural New Yorker* and *Prairie Farmer* directed their attention principally to the question of free trade versus protection. The *Rural New Yorker* hesitated to endorse outright the virtually prohibitive barley rates of the McKinley Bill of 1890, as New York brewers had up to this time apparently succeeded in popularizing the notion that the United States, especially New York State, could not grow barley suitable for malting. The brewers contended that no matter what the tariff was, good malting barley had to be imported. The gradual transfer to the West of the malting industry, following the imposition of the 30-cent per bushel tariff, indicates that New York barley production failed to respond sufficiently to hold the industry in the East.

The eastern farm papers saw protection in the barley tariff, "Of all the cereals, barley will probably be benefited more than any other,

as we have been rather liberal importers of this grain."[1] However, a western paper retorts that "growers of barley in certain narrow localities are happy [because] it will enable them to get a little more for first-class malting barley, but the fellows who are in regions where barley is liable to blacken in curing will not take to this clause worth a cent." The editorial advanced the belief that the barley tariff would

TABLE 11

UNITED STATES IMPORT DUTIES UPON BARLEY, BARLEY MALT, AND OTHER BARLEY PRODUCTS, 1883-1930.

| Tariff Act Year | Paragraph | Classification | Rate |
|---|---|---|---|
| | 260[1] | Barley, per bushel | 10 cents |
| 1883 | 262 | Barley malt, per bushel of 34 pounds | 20 cents |
| | 261 | Barley, pearled, patent, or hulled, per lb. | .5 cent |
| | 252 | Barley, per bushel of 48 pounds | 30 cents |
| 1890 | 253 | Barley malt, per bushel of 34 pounds | 45 cents |
| | 254 | Barley, pearled, patent, or hulled, per lb. | 2 cents |
| | 191 | Barley | 30% ad valorem |
| 1894 | 191 | Barley malt | 40% ad valorem |
| | 191 | Barley, pearled, patent, or hulled | 30% ad valorem |
| | 223 | Barley, per bushel of 48 pounds | 30 cents |
| 1897 | 224 | Barley malt, per bushel of 34 pounds | 45 cents |
| | 225 | Barley, pearled, patent, or hulled, per lb. | 2 cents |
| | 230 | Barley, per bushel of 48 pounds | 30 cents |
| 1909 | 231 | Barley malt, per bushel of 34 pounds | 25 cents |
| | 232 | Barley, pearled, patent, or hulled, per lb. | 2 cents |
| | 188 | Barley, per bushel of 48 pounds | 15 cents |
| 1913 | 189 | Barley malt, per bushel of 34 pounds | 25 cents |
| | 190 | Barley, pearled, patent, or hulled, per lb. | 1 cent |
| 1922 | 722[2] | Barley flour | 2 cents a lb. |
| | | Barley, hulled | 20 cents a bu. |
| | | Barley malt | 40 cents per 100 lbs. |
| | | Barley, patent | 2 cents a lb. |
| | | Barley pearl | 2 cents a lb. |
| | | Barley, unhulled | 20 cents a bu. |
| 1930 | 722[3] | Same as in 1922. | |

*Sources:* [1] U. S. Tariff Commission, Tariff Information Series No. 23, *Agricultural Staples and the Tariff*, page 109;

[1] *The National Stockman and Farmer*, Pittsburgh, Pa., November 6, 1890.

[2] Committee on Ways and Means, House of Representatives, *Comparison of Tariff Acts* 1909, 1913, and 1922;

[3] *Tariff Act of 1930*, Copy of Public Law No. 361.

act as a boomerang to the corn growers. "Canada buys a lot of corn from us. Those fellows who cannot raise stainless barley want to sell their corn."[2] The same paper held that the pending "McKinley Bill would give the masses a stone instead of bread" and hoped that either the Senate or President Harrison would kill the bill. In March, 1891, the *Rural New Yorker* pointed out that the Canadians had lost their American barley market because of the McKinley Tariff. "The Canadian government appropriated $25,000 for purchasing two row seed barley in England," and their purpose seemed to be to meet English market requirements, since the American market was lost to them. Later that fall the barley tariff was accredited with the high barley prices. That the barley growers had profited from the tariff was clearly evident! "The duty now on barley is 30 cents per bushel, an increase of 20 cents; but the price for the large crop this year is 78 cents per bushel instead of 48 cents for the short one a year ago."[3] Although California at this time produced twice as much barley as New York, not a word pertaining to the barley tariff appears in the *Pacific Rural Press*. Apparently the tariff was of no significance to its readers.

2 *Prairie Farmer*, Chicago, Ill., June 7, 1890.

3 *The Rural New Yorker*, September 5, 1891.

## CHAPTER V

## THE PROBABLE EFFECT OF THE TARIFF UPON PRICES

IF the tariff on barley had any effect on American prices its influence should be at least partly revealed by a comparison of United States and Canadian barley prices. Such a comparison is relatively simple, or is, at least, much less complicated than in the case of oats, corn, and wheat. This analysis reveals that with a few exceptions due to abnormal circumstances, the barley duty has been practically without effect.

### Some Possible Price Relationships Between the United States and Canada

1. *Normal Price Relation.* Since both Canadian and United States barley prices are determined in the same world market, one would conclude *a priori* that the prices in each country should tend to be equal, allowing for transportation costs, etc., a conclusion confirmed by the several price series of this chapter. In this case it may, therefore, be said that theory agrees with statistical analysis.

2. *Temporary Regional Maladjustment of Supply and Demand.* The relation between Winnipeg and Minneapolis barley prices may appear normal, while at the same time in Buffalo American barley sells at Canadian prices plus all, or part, of the duty. A temporary local or regional feed shortage in eastern United States, particularly when Great Lakes navigation is closed, might encourage such a maladjustment; the grain commission companies may underestimate the feed requirements of the eastern deficit feed area and thus limit their supplies in eastern elevators; or buyers of feed may err in their estimates and be short in their stock. Also, the demand for barley by eastern and commercial feed houses and dairymen may develop unexpected strength. These factors either singly or combined may bring about a price differential between Canadian and United States barley equal to or higher than the tariff. During such a period, Canadian barley held in bond in the United States or in store in eastern Canada tends to be absorbed by the domestic trade. Such a situation, however, is more likely to occur in oats than in barley because of the greater bulkiness of oats, its general acceptance as feed, and the fact that a smaller quantity of oats moves into the export trade. A pronounced temporary regional maladjustment of barley supplies has

not occurred since 1920, and there is little probability that prices will be affected by the tariff because of temporary circumstances such as these.

3. *Price Differentials between United States and Canadian Markets due to Wide Variations in Production.* A crop failure in one country and a normal crop in the other may bring about a price relation which would tend to move a part of the surplus into the deficit area. This appears less probable in the case of barley than for other grains. While it is true that oats and wheat crops in the United States are occasionally large during bad years in Canada, the barley crops of the two countries appear to follow the same production fluctuations. As already pointed out, they are grown under virtually the same geographical circumstances, so that a crop failure in Manitoba, Saskatchewan, and Alberta usually means a short crop, at least, in the Dakotas and Minnesota. The relatively narrow production range greatly decreases the possibility of wide opposite movements in a given year. The 1931 crops illustrate the point. Domestic wheat and oat production were large, while the Canadian output was cut nearly in half by drastic drouth conditions. The spring wheat area of the United States, along with the Prairie Provinces of Canada, suffered a partial crop failure, yet the extraordinary yields in the winter wheat belt more than offset the spring losses of the Dakotas, Montana, and Minnesota. Barley, on the other hand, was in both countries greatly reduced by the drouth.[1]

4. *Shortage of Feed Grains other than Barley.* Corn is the principal feed crop of the United States; upon its scarcity or abundance depends the general price of all the coarse feed grains. A partial corn crop failure, as in 1924, may create such an extraordinary feed demand for barley that even with a normal barley crop the eastward movement of surpluses will be reduced. Such a situation may lead to a price spread between Minneapolis and Winnipeg wide enough to make importation at Buffalo and other eastern points profitable.

[1] The bumper winter wheat crop and the spring wheat crop failure of 1931 also illustrates the influence of such production changes upon normal price differentials between markets. During May and June, 1931, Minneapolis wheat prices, which reflect spring wheat supply conditions, were about the same as those of Chicago. Chicago attracts little spring wheat but considerable winter wheat. In August and September, 1931, when the extent of the spring wheat crop failure became apparent, cash wheat prices in Minneapolis were quoted as much as 15 cents per bushel above Chicago. The September and December futures developed similar margins in favor of Minneapolis. On September 25, September wheat closed at 63 cents at Minneapolis and 48 cents at Chicago.

Likewise, a Canadian oat crop failure may force the price of barley out of its usual course. The increased demand for barley to meet feed requirements may drive the price of barley high enough to attract American imports. Though possible, it is very unlikely that even an extraordinary substitution of barley for oats could absorb the 30 million bushels or so of barley which Canada now exports annually. Yet in February, 1930, May barley futures in Canada sold for several cents per bushel less than oats, a most unusual circumstance (on February 10, 1930, May oats at Winnipeg were 59 cents; at Minneapolis, 43; May barley at Winnipeg was 56, at Minneapolis 58.) The limits of effective substitution are inferred in this price relation of oats and barley. The possibility that Canada will import American barley for feed is very remote. On the other hand, United States exports of barley were not stopped by the partial corn crop failures of 1924 and 1930. They were reduced, and the price differential between Minneapolis and Winnipeg barley was materially affected, yet barley prices for these years continued on an export basis.

5. *Price Sustention by Government Action, Monopoly or Semi-Monopoly Maintained Price.* The program of the Federal Farm Board falls into this category. Although the Farm Board concentrated its grain trade activities on wheat, it thereby affected the domestic price level of all feed grains. The extraordinary decline in world wheat prices depressed all grain prices; but to the extent that domestic wheat was held above world prices (export parity on Liverpool) domestic barley prices were indirectly maintained.

The semi-monopoly price control of the Federal Farm Board was responsible for a pronounced price spread between Canadian and United States barley. During the stabilization operations from September, 1930, to April, 1931, domestic prices of No. 2 barley at Minneapolis averaged 25 cents a bushel above No. 4 Canadian Western barley at Winnipeg. Even though the poor corn crop of 1930 was a contributory factor, the major circumstance responsible for the price spread was the stabilization policy of the Farm Board. A further factor was the demoralization of the Canadian grain trade during part of this period due to the partial collapse of the Wheat Pool. In July and August, 1930, Minneapolis cash wheat prices ruled 2.5 cents per bushel higher than Winnipeg. The world wheat market crash started in September, when the Farm Board stepped into the averaged 77 cents per bushel while Winnipeg averaged 46 cents, a

spread of 29 cents. During December, 1930, barley at Minneapolis sold for as much as wheat at Winnipeg. The decline in wheat prices depressed the other grain markets more sharply, of course, in Canada than in the United States. This is clearly shown by the realignment which took place as soon as the Farm Board withdrew. While barley exports from the upper Mississippi Valley virtually stopped, Canadian barley exports were stimulated. Clearly the barley tariff protected the Farm Board in its operations. Yet this protection was more nominal than real because of the demoralized state of the coarse feed grain market. By June, 1931, the price spread between Minneapolis and Winnipeg was again normal, at 7 cents per bushel.

6. *Price Spread Due to Quality Variation.* Barley imports prior to the McKinley Tariff Act were strictly on a quality basis. It is possible that even now the few remaining brewers of New York occasionally buy malting barley in the Canadian market, although available data indicate no such importations. Certainly market prices in recent years indicate no scarcity of high grade malting barley. There has been no premium paid for malting barley; it has sold essentially at feed barley prices.

TABLE 12

COMPARISON OF AVERAGE ANNUAL PRICES OF MALTING BARLEY AND FEED BARLEY AT MINNEAPOLIS, 1925-26 to 1930-31.

(cents per bushel)

| Crop year beginning August 1 | Malting barley | Feed barley[1] | Differential in favor of malting barley |
|---|---|---|---|
| 1925-26 | 62 | 65 | —3 |
| 1926-27 | 70 | 72 | —2 |
| 1927-28 | 85 | 84 | +1 |
| 1928-29 | 63 | 64 | —1 |
| 1929-30 | 58 | 56 | +2 |
| 1930-31 | 50 | 47 | +3 |

[1] No. 2 barley.

*Sources:* U. S. Departent of Agriculture, *Yearbook of Agriculture, 1932,* trade sources, and price data furnished by maltsters.

Less remote possibilities of abnormal price relations may be due to one or more of the following circumstances: (a) should American and Canadian marginal production costs attain a degree of equilibrium, an advance in domestic or a decrease in Canadian freight costs

would result in "freight dumping", which may be quite unintentional. Also, barley passing through our eastern deficit area in bond for export from New York, Baltimore, and Boston may enjoy certain trade privileges which result in "concealed dumping".

(b) In more or less isolated areas along the border, barley may be imported or exported, according to the relative scarcity or abundance within such localities. Seed barley is particularly subject to this local movement, in spite of the tariff.

## Minneapolis and Winnipeg Barley Prices

Winnipeg is the principal market for all Canadian grains; in the United States there are many primary markets, of which, however, Minneapolis is by far the most important. It possesses a combination of advantages over Chicago, Milwaukee, and Duluth, principally from its location. It has a direct outlet to the Great Lakes via Duluth, and a feed market among the dairymen of Minnesota and Wisconsin. It is situated in the very heart of the barley producing area of the upper Mississippi Valley. Furthermore, it can supply barley to Wisconsin and Illinois maltsters as readily as can Milwaukee and Chicago. The fact that Minneapolis is probably the leading market dealing in barley futures evinces its price leadership and importance. Winnipeg prices register the forces which move Canadian barley from the Prairie Provinces to Fort William-Port Arthur and on to the North Atlantic seaboard for export; Minneapolis plays a similar role in the price system of American barley, the surpluses of which originate in the Dakotas and Minnesota and move eastward via Duluth to the North Atlantic coast.

*Obtaining Comparable Grades.* Perhaps the most elusive element in a price comparison is comparability of the commodities. For this reason it appears worthwhile to include all available data indicating the degree of comparability existing between certain United States and Canadian barley grades.

Number 2 barley prices have been used for Minneapolis, and number 4 Canada Western for Winnipeg. Prices for these two grades, on their respective markets, are the base prices and are therefore most readily obtainable.

Canadian 3 C. W. Barley—U. S. No. 1 Barley 50 pound test weight, 2 per cent broken and skinned barley.

Canadian 4 C. W. Barley—U. S. No. 2 Barley 48½ pounds test weight, 7 per cent broken and skinned barley.

Canadian rejected Barley—U. S. No. 2 Barley 49 pound test weight, 6 per cent oats.

Canadian Feed Barley —U. S. No. 3 Barley 44 pound test weight; 10 per cent wild oats; 2 per cent foreign material; 86 per cent sound barley.[2]

"Western Canada No. 4 Barley compares very favorably with United States No. 2 Barley. Western Canada No. 4 Barley, required to weigh 46 lbs. to the bushel, may be composed of any variety or type, or combination of varieties or types, may contain damaged barley or stained barley, but not heated, required to be sweet. It may contain 14.6 per cent moisture and may contain 10 per cent of other domestic grain, wild oats, and seed, singly or in combination, seeds not to exceed 3 per cent."[3]

"United States No. 2 Federal Barley seems to be between Canadian No. 4 C. W. Barley and No. 5 C. W. Barley. I think No. 4 C. W. Barley is the maximum of the grade of United States No. 2 Federal Barley, perhaps a little better, i. e., the Canadian Barley is stronger. United States No. 2 Barley is better than No. 5 C. W. Barley. In making this comparison I am working on the new Canadian Barley grades and enclose a copy of new classification effective August 1, 1929. I am also mailing you small samples of No. 4 and No. 5 C. W. Barley."[4]

[2] For this information I am indebted to Mr. John G. McHugh, Secretary, Minneapolis Chamber of Commerce from whom I quote: "I have secured four average standard samples of barley from Winnipeg through a member of the Winnipeg Grain Exchange. The letter accompanying these samples states: 'we are forwarding under separate cover samples of our Three C. W., Four C. W., Rejected, and Feed Barley. These are the only grades that are coming through this year and are the average taken from our inspection department here. There is no dockage on the samples submitted.' "

These four samples were submitted to the licensed federal inspectors at Minneapolis and graded as stated above.

[3] Statement of Chief Inspector James D. Fraser of the Department of Trade and Commerce, Canada, Board of Grain Commissioners for Canada, Winnipeg, Manitoba.

[4] Comparison made by the representative of the Cargill Grain Company, Limited, Montreal, Canada.

*Actual Average Prices.* Figure 5 shows that the tariff has not established a price differential between Minneapolis and Winnipeg except in a few isolated instances. The two markets move in apparent sympathy with each other. For a period, Minneapolis buyers are willing to pay a few cents more than Winnipeg prices but with a shift in the domestic or Canadian stock, or other price factors, the price differential turns in favor of Winnipeg. This fluctuation was well illustrated in 1927-28. The 1927 crop opened with Winnipeg about 6 cents above Minneapolis prices; the spread decreased as the season advanced; early in 1928 Minneapolis prices rose above Winnipeg. By June the spread in favor of Minneapolis had widened to about 7 cents and by July of that same year, the differential again was in favor of Winnipeg.

MOVEMENT OF MINNEAPOLIS AND WINNIPEG
BARLEY PRICES

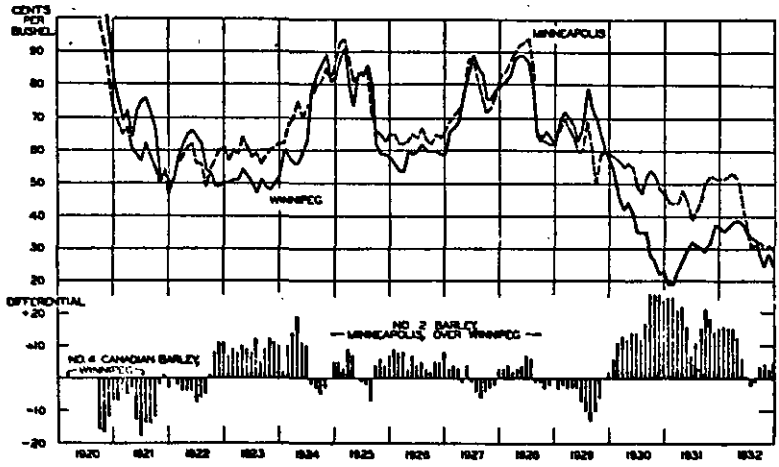


FIGURE 5. In their annual and secular movements barley prices at Minneapolis and Winnipeg tend to be quite similar. That the world market price is the principal price determinant of both American and Canadian barley prices accounts for this similarity in price movements. Note how the operations of the Federal Farm Board affected the price differentials.

The calendar year 1923 shows a price differential of nearly 10 cents per bushel in favor of Minneapolis. Domestic exports other than California barley dropped to half a million bushels, the lowest since 1911. In 1925 and 1927 the two markets kept within a few cents of each other and domestic exports were 17 and 26 million bushels respectively. In 1926, however, Minneapolis prices averaged

about 6 cents above Winnipeg and domestic exports from the Minneapolis region dropped from the 17 million bushels of the preceding year to 4 million bushels.

Since we export 10 per cent of our barley crop, while Canada exports nearly 25 per cent, Minneapolis is less responsive than Winnipeg to the foreign markets. Domestic exports from the upper Mississippi Valley have since 1921 tended to increase, though the range has been from virtually zero in 1923 to 28 per cent of the crop in 1928.[5]

*Future Prices.* Theoretically at least, for purposes of comparison, future prices have advantages over cash prices. Assuming that the cash and futures markets are equally active and developed, futures quotations eliminate quality variations and temporary market situations better than do cash prices. The futures contract in grain is a transaction in which the buyer and seller have bargained for a more or less abstract average, that is, a general composition of the usual characteristics stated in the grade specifications. The cash price of No. 2 barley at Minneapolis may reflect premiums above its grade specifications for one or more of several desirable characteristics scarce at the particular time, whereas futures prices are based solely on the general grade characteristics. For example take wheat, a carload arriving from Montana may be graded No. 1 Northern Spring upon the Minneapolis Grain Exchange. This wheat is deliverable upon a future contract without premium or discount. Nevertheless, if protein wheat is scarce and this car happens to test 17 per cent protein, it may command a 25-cent per bushel premium above the grade price. In this case No. 1 Northern Spring futures may bring $1.00 while the actual cash price is $1.25 per bushel. Another carload of the same grade of wheat may, because it tests only 11.5 per cent protein, sell at the grade price. Where premiums are paid for special qualities,

5 A principle usually held in economic theory contends that the wider the market the narrower the range of price fluctuations. This does not necessarily apply to agricultural products. At least, a study of Figure 5 would indicate that although the Winnipeg barley market is much more dependent upon world prices (foreign trade) than the Minneapolis market, Winnipeg prices have fluctuated the more widely.

Professors Warren and Pearson have pointed out this exception in the case of farm commodity prices. "There may be some doubt whether the amplitude of cyclical price movements can be explained from the 'simple principle that the wider the range of the sources of supply, the greater the steadiness of prices.' For agricultural products, where climate changes—in their nature unrelated to the extent of the market—are the cause of price variations and application of the principle is obvious."

Warren and Pearson, "Statistics and Economic Theory", *Review of Economic Statistics*, July, 1925, p. 203.

therefore, futures quotations tend to greater uniformity than cash prices.

A second reason for using futures in price comparisons is that they are influenced presumably less by temporary market disturbances. Local market congestion, shortage of particular qualities necessary for local consumption, arrival of large quantities of green grain from combines, grain that has begun to heat, all may violently affect cash prices. Then, too, an apparent maladjustment in futures between two markets may be corrected by telegraphic sales upon a moment's notice, while equilibrium in cash prices may not be attained for a day or an entire season. Suppose, for instance, Winnipeg receives badly frosted barley, while the Minneapolis receipts are of exceptionally good barley; or, the Minneapolis market is temporarily demoralized, as it was in 1928, by a barley scab scare, while Winnipeg receives no scabbed

TABLE 13

THE AVERAGE ANNUAL BARLEY CASH PRICE AND FUTURE PRICE DIFFERENTIALS OF MINNEAPOLIS OVER WINNIPEG, 1920-21 to 1930-31

(in cents per bushel)

| Crop Year Ending July 31 | Cash differential | Future differential |
|---|---|---|
| 1920-21 | —10.0 | —9.5 |
| 1921-22 | — 4.8 | —2.4 |
| 1922-23 | 7.4 | 4.1 |
| 1923-24 | 9.3 | 7.0 |
| 1924-25 | 1.1 | 2.0 |
| 1925-26 | 4.9 | 5.5 |
| 1926-27 | 2.6 | — .8 |
| 1927-28 | 1.4 | —5.0 |
| 1928-29 | — 3.2 | —8.2 |
| 1929-30 | 4.6 | —1.6 |
| 1930-31 | 21.3 | |

*Source:* U. S. Department of Agriculture, *Yearbook of Agriculture, 1931;* Canada Dominion Bureau of Statistics, *Report of the Grain Trade of Canada.*

barley. In either case the cash price of the two markets may spread unduly. In such instances, theoretically at least, the futures quotations are more stable than cash prices, since they are supposedly not affected by intra-grade variations and temporary market disturbances.

A third reason for the use of futures prices is the influence of so-called "corners". Frequently there is a "squeeze" during the delivery month. When the "longs" demand the delivery of the actual

grain the "shorts" are forced to pay premiums in order to obtain grain to cover their commitments. Mild "squeezes" occur more frequently in the grain trade than is usually supposed. The squeeze at Chicago in July corn, 1931, is a good example, and the corner on December rye in Chicago in 1929 is a further illustration. While futures quotations are not entirely free from the influence of "corners", they are affected less than are cash prices. By shifting to the next prevailing future at the beginning of the delivery month of the current future, short time squeezes may be eliminated from future prices, while it is quite impractical to adjust cash prices for these temporary corners. Price manipulations over a longer period, however, do influence futures as well as cash prices.

Usually the practical limitations of futures prices quite offset any theoretical advantages they may have. The barley futures market lacks sufficient volume to assure a steady price; it is unduly affected by large sales and purchases. It is quite unlike the wheat futures market, in which the significant demand and supply trends are sometimes blurred by the enormous turnover. A second difficulty in using future prices, particularly in a comparison, is the selection of the proper future. March, May, July, and September futures may all be open and active at the same time. The selection, as well as the point at which to transfer to subsequent futures, presents a difficult problem. Even if the nearest prevailing future is used, shifting to the next future at the first of the delivery month, there remains the problem of inter-market variations in the futures prevailing. The same future does not necessarily govern in both Minneapolis and Winnipeg.

CASH AND FUTURE PRICE DIFFERENTIALS OF BARLEY
BETWEEN MINNEAPOLIS AND WINNIPEG

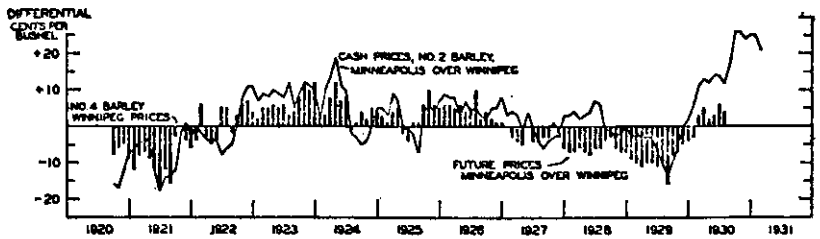


FIGURE 6. Both cash and future prices show the same general characteristics. In a well developed futures market, some preference might be given to the futures quotations as a measure of the effective differences between the two markets. In practice, however, both sets of prices are subject to considerable limitation.

In Figure 6 the differentials of Minneapolis and Winnipeg are shown both for futures prices and actual prices. Without exception the two have followed the same spread trend, but the spread between actual prices was wider than the spread between futures, and subject to greater fluctuations.

## The Effect of the Barley Tariff

If the preceding price comparison between Minneapolis and Winnipeg presents a normal relationship, the tariff has obviously not affected barley prices, except during the period when the stabilization operations by the Federal Farm Board raised domestic prices. The cash prices and even more the prevailing futures prices indicate a general sympathy between these two primary markets.

For a time the Winnipeg price may exceed that of Minneapolis, and vice versa; in spite of the constant crisscrossing in the price movements of these markets they follow the same general trend. The conclusion is evident; there is no regular price differential between Canadian and United States barley; the tariff in normal market years, therefore, is not effective. Men of the grain trade contend that in their experience, since national prohibition, the tariff on barley is essentially nominal.

Without attempting to evaluate the price differential method as a general measure of tariff effectiveness, it is certainly least objectionable when the results are negative. If no differential exists between two markets there can be no question concerning its division. If a differential occurs, as in the case of sugar, wool, and some other commodities, the question might well arise as to whether this differential was due to a fall in the foreign price, a rise in the American price, or both. In the case of barley these questions are irrelevant. If over a period of years two primary markets in competing countries show no tendency to maintain a spread, it appears evident, allowing for other factors, that the tariff barrier is ineffective.

The probabilities of the effectiveness of the barley tariff under exceptional price circumstances have been discussed. Such circumstances are important at particular places and times, yet for the trade as a whole they are indeed insignificant. The notable exception is price-fixing by governmental action. If the Federal Farm Board or any other monopolistic control is able to keep domestic above world prices, the tariff to that degree tends to be a price factor. But if production is greater than domestic demand at these maintained prices,

such prices can prevail for only a limited period. The unprecedented surpluses of grain accumulated in the United States by the activities of the Federal Farm Board indicate the limitations of an attempt to keep domestic prices above an export parity. Without some control over production, or some way of disposing of the surplus, it is at present impossible to maintain barley prices above the normal export point. The tariff was a price factor while the Farm Board was in action, but since such a price can at best be only temporary, it appears reasonable to conclude that the tariff on barley is nominal.

## The Probable Future Effect of the Barley Tariff

Even the repeal of the Eighteenth Amendment will not make the barley tariff an important price factor. Although beer has been legalized, the extraordinary expansion in production during the last few years makes it virtually impossible for the demand arising from the consumption of beer to absorb even a major part of the crop now grown. The bulk of the crop will continue to go into feed channels and sell at feed prices in direct competition with corn and oats. Under present circumstances the price of corn, the major feed crop in America, practically governs feed grain prices. Half of the corn crop is fed to hogs, a fact which has established the relation between corn and hog prices known as the corn-hog ratio. Hog products in turn are definitely on an export basis, and there is no indication at present of any change. Thus, barley as a feed grain will in all likelihood continue on an export parity. Direct exports of feed to English and German hog growers probably will continue. More significant, however, is the fact that barley will continue to flow into the export trade as pork and pork products. Consequently, although the increasing use of beer will greatly expand the demand for barley suitable for malting, most of the crop will remain on a feed basis. The tariff certainly will continue to be ineffective on that part of the crop used for feed and probably also on malting barley.

# PART II OATS

## CHAPTER VI

## PRODUCTION

OATS rank third among the cereal crops of the United States, exceeded only by corn and wheat. The reasons for this position are several. Oats as feed for horses and young stock are excellent; the seasonal labor requirements of the crop and its favorable effect upon soil make it fit admirably into farm rotations, especially in Corn Belt farming; in addition, it is used as a nurse crop for grass seeding. Were the oat tariff effective it would benefit over two million American farmers. The importance of the crop is also evident in its farm value, which for 1925 to 1929 is estimated at $556,000,000 annually, of which $125,000,000 was cash income. Most of the oats are used upon the farm as feed for horses, hogs, cattle, dairy cows, or poultry.

Acreage in the United States has expanded from 10 million to 43 million acres since 1870. A sharp drop in 1919, due to post-war abnormalities, was followed by a reaction in 1921, when 45 million acres were sown. In recent years farmers have been urged to curtail oat production, and in a few states have found barley a more profitable feed crop. There is no indication, however, of such a decline in production as to put us on a domestic basis soon, since the home uses for oats will probably shrink faster than production. The present crop continues well above 40 million acres. Production has fluctuated

TABLE 14

UNITED STATES AVERAGE ANNUAL OAT PRODUCTION, EXPORTS, AND IMPORTS FOR FIVE-YEAR PERIODS, 1911-1931

(million bushels)

| Crop Year | Production | Exports[1] | Imports[1] |
|---|---|---|---|
| 1911-1916 | 1,230 | 48 | 5.4 |
| 1916-1921 | 1,412 | 76 | 2.9 |
| 1921-1926 | 1,318 | 22 | 1.9[a] |
| 1926-1931 | 1,293 | 10 | .2 |

[1] Foreign trade, including meal, year beginning July 1.

[a] Four year average.

*Source:* U. S. Department of Agriculture, *Yearbook of Agriculture, 1932.*

ACREAGE, PRODUCTION, YIELD AND FARM PRICE
TRENDS OF OATS

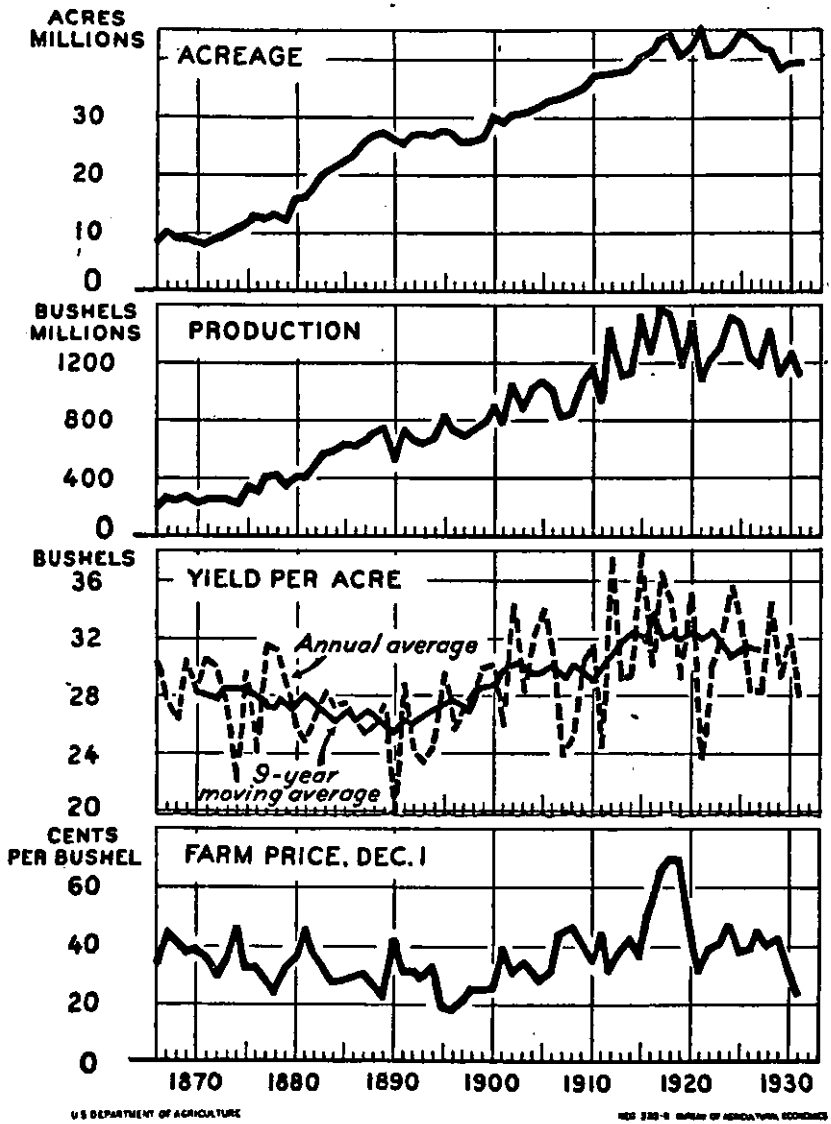


FIGURE 7. The consistent upward trend in oat acreage and production until about 1920 is noteworthy. Yields, too, improved. The economic pressure of the automobile, truck and tractor upon horses, hence upon oats, is chiefly a post-war development.

widely from year to year; usually it is about 1,300,000,000 bushels. The actual output since the World War has ranged from a billion bushels in 1921 to a billion and a half in 1924, and the yield per acre has increased slightly.

*Leading Oat States.* Three-fourths of the average production for the years 1926-1930 was distributed as follows: Iowa, 215 million bushels; Minnesota, 145; Illinois, 139; Wisconsin, 98; Nebraska, 74; Ohio, 68; Indiana, 62; South Dakota, 57; Michigan, 52; North Dakota, 42. Acreage in all of these states has shown some tendency to decrease, particularly in the Dakotas and Minnesota, where barley is apparently to some extent replacing oats as well as wheat. In these three states since 1921 oats decreased over three million acres, while barley increased by a corresponding amount. In spite of the pro-

GEOGRAPHICAL LOCATION OF DOMESTIC OAT ACREAGE

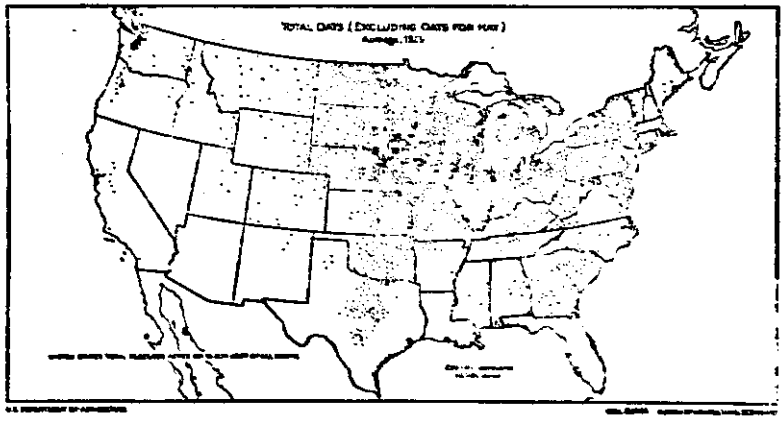

FIGURE 8. Corn Belt farming has thus far found oats necessary to complete its crop rotation, although the oat plant is better suited to the general crop conditions of the region directly north of the Corn Belt.

nounced changes in the demand for oats during the last decade, they continue to occupy an important place in American agriculture.

The trade area of oats is limited, because they are too bulky to stand the costs of long hauls. They are usually less valuable by weight than the other feed grains. International commerce is insignificant, and hence there is little integration among the oat markets of the world. The degree of price interrelation found in world wheat,

flaxseed, or wool markets is unknown in oats. Their high transportation costs make them more subject to local supply and demand than most other cereal crops.

*World Oat Production.* World production, excluding China, is nearly five billion bushels, of which the United States and Russia produce about one-half. From 1926 to 1930 United States crops averaged 1,270 million bushels, as against 1,070 million bushels for Soviet Russia. Production in western Europe is slightly higher

PRODUCTION AND EXPORTS OF OATS
FOR SELECTED COUNTRIES


FIGURE 9. Oats do not enter World commerce in any appreciable quantities. They are too bulky. Argentina alone exports a considerable proportion of its oat crop. This figure is based on 1926-27 to 1929-30 averages.

than in the United States. In both Russia and the United States the percentage of exports is less than one per cent of the usual crop. Argentina, on the other hand, which produces only 60 million bushels yearly, leads the world in exports. For the five years mentioned, 29 million bushels, or 45 per cent of production, entered international commerce.

*Canadian Oat Production.* Canada is the only competitor which can enter our domestic market; not even Argentina has actually sold an appreciable quantity of her surplus in the United States. Canadian oats can readily enter domestic trade channels; in eastern United States there are usually some Canadian oats stored in bond which are readily absorbed by the trade when prices permit. It is here that the tariff comes into play. On the other hand, Canada is our best market for exports. In most years she buys more oats from us than she sells to us.

Canadian oat, unlike barley and wheat, production has not increased during the last decade. The average crop from 1910-1914 was 340 million bushels, and it increased to 420 million bushels for 1915-1918, since which time it has varied little. For the period 1924-1928 it averaged 417 million bushels annually. Exports have remained at about 3 per cent of the normal crop.

## Some Factors Affecting American Production

*Climate of the North Central States.* Oddly enough, the center of domestic oat production does not possess the optimum climate

TABLE 15

AVERAGE OAT PRODUCTION AND EXPORTS FOR SELECTED COUNTRIES, 1926-27 TO 1929-30

(million bushels)

| Country | Production | Exports | |
|---|---|---|---|
| | | Total | Percentage of production |
| United States | 1,270 | 12.3 | .9 |
| Russia | 1,070 | 1.7 | .2 |
| Germany | 470 | 23.8 | 5.1 |
| Canada | 410 | 11.9 | 2.9 |
| France | 360 | 1.7 | .5 |
| Poland | 160 | 2.9 | 1.5 |
| England and Wales | 100 | 1.2 | 1.0 |
| Argentina | 60 | 28.6 | 48.5 |

*Source:* U. S. Department of Agriculture, *Yearbook of Agriculture, 1931.*

requirements of the crop. About half of the crop is grown in the north central states west of the Mississippi River. Production is concentrated mainly in the Corn Belt states, whose warm summer climate is not favorable to the plant, while that of the section immediately north is nearly ideal. Minnesota, on the northern fringe of the Corn Belt, is the only state of this optimum region with a large oat production.

*Oats in Corn Belt Crop Rotation.* In spite of the warm summers of the Corn Belt, oats make a very good rotation crop where corn is the major product. They may even be grown at an apparent loss, because they do not interfere with the corn labor supply, and are a fair nurse crop.

They are the principal nurse crop for clover and grass in the north central states. Their dense foliage and heavy drain upon soil moisture make them less suitable for this purpose than barley, but certain early varieties tend to overcome these objections.

*The effect of Tractors, Trucks, and Automobiles upon Production.* The rapid expansion in the use of tractors, trucks, and automobiles since 1920 has sharply reduced the demand for horse feed, and as a result has released from 18 to 25 million acres from feed production. Although the crop has become less profitable, Corn Belt farmers have not found an entirely adequate substitute in their crop rotation. In the Dakotas and Minnesota they have turned to barley as an alternative, but it is less satisfactory in the Corn Belt proper. For one reason, barley rotated with corn is likely to develop scab infection. A more important factor, however, is that barley is even more adversely affected by a warm climate and high humidity than oats.[1]

1 "The replacement of horses and mules by tractors, trucks and automobiles, has advanced as yet only a little way, considering the United States as a whole. but its continued progress appears inevitable. The number of tractors on farms at present is nearly 900,000; while the number of work horses and mules (2 years old and over) decreased from about 20,600,000 in 1918, the peak year for the United States as a whole to 18,000,000 in 1929, or twelve per cent. But the number of horse and mule colts has decreased from a maximum of about 4,500,000 in 1916 to about 1,400,000 in 1929. With the number of colts being raised less than half sufficient to replace the work animals that die annually or become useless, it is obvious that the continued substitution of tractors and trucks for horses and mules is certain for several years at least.

*"Crop Land Released by the Decrease in Horses and Mules, 1920-1929.*

The number of horses on farms in the United States was about 19,848,000 on January 1, 1920, (the peak of 20,022,000 was reached in 1915) and 14,029,000 on January 1, 1929; but the number of mules was about the same (5,475,000 January 1, 1920 and 5,477,000 January 1, 1929—the peak was reached in 1926, however). The number of horses and mules in cities decreased from 2,084,000 on January 1, 1920 to about 1,450,000 on January 1, 1929. The aggregate decrease in total horses and mules of all ages on farms and in cities in the nine years was from about 27,300,000 to about 20,900,000 or 23 per cent. But as so large a proportion of the decrease was of colts, the decrease in feed consumption was much less—only about that required for 5,400,000 animal units, or 21 per cent, (colts estimated to consume half the feed needed by a mature animal). Since it requires about 3⅓ acres of crops annually on the average, in addition to pasturage, to feed a mature horse or mule (animal unit), this decrease of horses and mules has released 18,000,000 acres, more or less, of crop land for other uses since 1920."

Baker, O. E., *Regional Changes of Farm Animal Production in Relation to Land Utilization,* U. S. Department of Agriculture, 1929, Preliminary Report.

# CHAPTER VII

## MOVEMENT OF THE UNITED STATES AND CANADIAN CROPS

Where and when does the tariff protect the domestic market from Canadian oats? The answer to this question involves a glance at the movement of the Corn Belt and western Canadian surpluses to the eastern deficit areas. In tracing this physical movement of the crop it becomes evident that if the tariff is a price factor at all, it is so in eastern United States. It is here that, seasonally at least, Canadian oats enter domestic trade channels. Yet in this same area there is a seasonal movement of American oats into Canada.

As feed, oats are used widely, ranking next to corn. In recent years 25 per cent of the crop has been sold off the farm. In the north central states west of the Mississippi River this proportion is not so great, largely because of the increasing importance of livestock in this area.

In the ten years, 1920 to 1929, 24 per cent of domestic production was shipped out of the county of origin. During this period, Iowa marketed about 37 per cent of her production; Minnesota, 25 per cent; Illinois, 43 per cent; Wisconsin, 8 per cent; South Dakota, 28 per cent; Ohio, 29 per cent; Indiana, 35 per cent; and Michigan, 19 per cent.[1] A recent study in Iowa, however, suggests that these figures are subject to considerable error.[2]

*Primary Markets.* Chicago is clearly the principal oat market of the United States, as it receives one-third of the 10 primary markets' receipts. In the last decade its receipts have declined from an average of 120 million bushels for the period 1914-1920 to less than 40 million bushels in recent years. Milwaukee receipts have decreased by about half; the decline at St. Louis, Peoria, and Omaha has been less pronounced, while receipts at Minneapolis have actually increased.

*Shipments from the Primary Markets of the Upper Lake Region.* The point of actual competition between American and Canadian oats

[1] Adapted from U. S. Department of Agriculture, *Crops and Markets*, March, 1931, p. 84.

[2] Bentley, Ronald C., *The Movement of Iowa's Commercial Corn and Oats*, Iowa State College of Agriculture and Mechanic Arts, Bulletin No. 252, p. 356. Mr. Bentley's study covering the state of Iowa gives the average shipments out of county for the crop years 1924-25 to 1926-27 as 28 per cent of the production.

is in eastern United States, whose dairy industries may obtain their feed supplies either from the North Central States or from Canada. Shipments east from Milwaukee, Duluth, and particularly Chicago, as her decreased receipts would indicate, have declined materially since 1920. The shipments from Duluth have shown the greatest year-to-year variations, ranging from less than half a million bushels in 1920 to over 25 million in 1925. Between 40 and 90 million bushels a year were moved eastward from these ports from 1920 to 1930. Chicago shipped an average of 40 million bushels, or two-thirds of the total, of which about a fourth were by water. All oats from Duluth moved via the lakes, while Milwaukee shipments were divided about equally between rail and lake routes.

TABLE 16

SHIPMENTS OF OATS FROM THE PRIMARY MARKETS OF THE UPPER LAKES REGION, 1920-1930

(million bushels)

| | Total | Chicago[1] | | Duluth-Superior[2] | Milwaukee[4] | |
|---|---|---|---|---|---|---|
| | | By lake | By rail | By lake | By lake | By rail[a] |
| 1920 | 66.2 | 1.4 | 43.4 | .3 | 10.9 | 10.2 |
| 1921 | 75.8 | 19.5 | 39.4 | 3.5 | 7.3 | 6.1 |
| 1922 | 95.9 | 12.2 | 57.1 | 8.2 | 6.4 | 12.0 |
| 1923 | 73.7 | 2.6 | 48.0 | 2.0 | 5.7 | 15.4 |
| 1924 | 67.0 | 7.7 | 34.5 | 11.0 | 4.1 | 9.7 |
| 1925 | 79.6 | 13.3 | 29.5 | 25.1 | 6.1 | 5.6 |
| 1926 | 50.9 | 10.2 | 22.2 | 11.4[3] | 2.7 | 4.4 |
| 1927 | 42.7 | 5.7 | 17.4 | 7.8 | 7.6 | 4.2 |
| 1928 | 42.1 | 6.6 | 23.5 | 3.6 | 4.3 | 4.1 |
| 1929 | 34.6 | 8.7 | 22.6 | 3.3[2] | Figures not Available | |
| 1930 | 37.9 | 6.7 | 24.1 | 7.1 | | |

[a] Include shipments west and north from Milwaukee. These shipments are relatively small. The bulk of rail shipments are south and east.

*Sources:* [1] Compiled from the *Report of the Trade and Commerce of Chicago.*

[2] *Annual Reports of the Duluth Board of Trade.*

[3] *Statistical Reports of Marine Commerce of Duluth, Minnesota, and Superior, Wisconsin.*

[4] *Milwaukee Chamber of Commerce Annual Reports.*

*Origin of Receipts at Upper Lake Ports.* Chicago in 1923 drew over half of its 75 million bushels from Iowa; nearly all of the remainder came from Illinois. Of this total 50 million bushels were absorbed by the eastern deficit region.

Over 60 per cent of Milwaukee receipts, which are about a fourth those of Chicago, come from Iowa; Minnesota supplies the second

largest share. Duluth sometimes clears large shipments, as in 1925 when she shipped 25 million bushels eastward. Receipts at Duluth come mainly from North Dakota and Minnesota.

## Movement of the Canadian Crop

The Prairie Provinces of Alberta, Saskatchewan, and Manitoba produce about 60 per cent of the total Canadian production, and account for virtually all of the exportable surplus. These provinces ship their crop to Fort William and Port Arthur and thence eastward over the Great Lakes to American or Canadian North Atlantic ports. The oats shipped to American ports move in bond, and under suitable price circumstances, of which the 16-cent per bushel tariff is one, may be sold in the United States.

As in the case of barley, the American and Canadian oat surplus moves eastward from the upper lake ports via the Great Lakes. The early seasonal exports from the United States are consigned to Montreal, Quebec, and other Canadian ports. The early Canadian crop, marketed fully a month later than those from Iowa, Illinois, Minnesota, and the Dakotas, moves out over the cheaper Welland Canal and St. Lawrence River route; however, this outlet is closed by ice before any considerable quantity of the Canadian surpluses have cleared. After the freezing of the St. Lawrence both American and Canadian exports tend to move to the American ports. This crisscrossing in the movement of Canadian and American grains means that in exceptional years it is possible that the bulk of the United States spring wheat, barley, and oat exports will be shipped via Canadian ports, while most of the Canadian grain exports will be shipped via United States ports. The tariff in the case of both oats and barley is a price factor only during more or less temporary feed scarcities in the region through which both crops pass.

*Distribution of the Canadian Crop.* Canadian oats are essentially a feed grain, as they are in the United States, and are grown as a cash crop to an even more limited extent than is barley. Their bulkiness limits their movement from surplus to deficit areas in Canada as everywhere, so that the great share of the crop year after year is fed on farms.

The surplus of the western division, which includes Alberta, Saskatachewan, and Manitoba, is consigned to eastern centers. After the deficit area is supplied the remainder may be exported from Quebec,

Montreal, and other Canadian ports. A negligible quantity, three or four thousand bushels yearly, is imported into the western division, principally for seed purposes. Fort William-Port Arthur handles most of the western surplus, shipping it via the Great Lakes to eastern Canadian ports. Direct exports move, in the main, to United States ports. Some three to nine million bushels annually are shipped eastward by rail.

CANADIAN PRODUCTION AND EXPORT
OF OATS

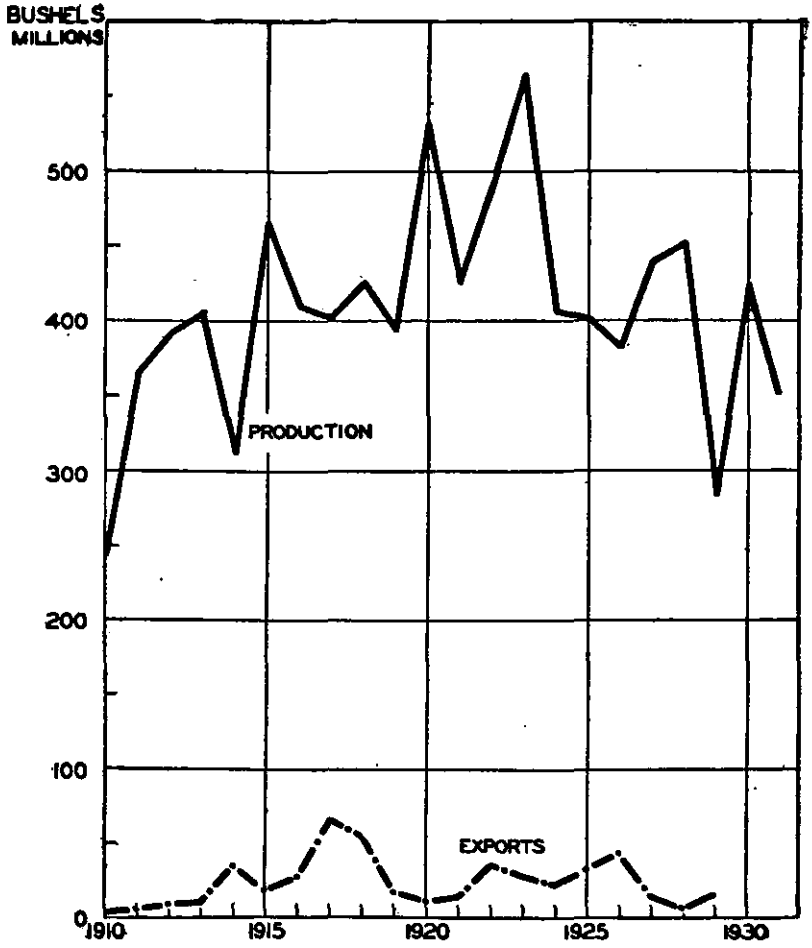


FIGURE 10. As in the United States, Oats are produced in Canada principally for feed. Oat exports from Canada to the United States since 1920 have been consideraby smaller than exports of American oats to Canada.

During the four crop years 1925-26 to 1928-29 the oat transactions of the eastern division of Canada, which is a deficit area attracting both United States and western Canadian oats, averaged about 165 million bushels. Imports, virtually all of which came from the United States were 2.5 million bushels annually. Receipts from the western division averaged 28 million bushels. Exports for the same years averaged 14 million bushels, so that the eastern division uses nearly half of the receipts from the western division.

To summarize: the North American oat crop is grown essentially for feed, and is for the most part consumed upon the farm where produced. About a fourth of the United States crop is marketed, and the proportion in Canada is even less. The surplus crop, originating principally in the Corn Belt states, Minnesota, and the Dakotas, and in Alberta, Saskatchewan, and Manitoba, moves eastward either via the Great Lakes or by rail. Local deficit regions within the general surplus area are negligible. The significant deficit area from the standpoint of the tariff is eastern United States and Canada. Since our eastern states absorb most of the domestic surplus both exports and imports are relatively insignificant.

# CHAPTER VIII

## IMPORTS AND EXPORTS

OAT production in the United States is on an export basis, although only around one per cent of the total is ordinarily sold abroad. Even in 1925, the largest export year since the World War, the 30 million bushels exported were less than 3 per cent of the crop. In spite of this net export, each year there are seasonal imports from Canada. From 1926 to 1930 exports have averaged about eight million bushels, 60 per cent of which was consigned to Canada. Exports have fluctuated widely, from a million bushels in 1923-24 to 31 million bushels in 1925-26. Paradoxical as it appears, Canada, our only competitor in the domestic oat market, is our principal foreign customer.

TABLE 17

UNITED STATES OAT EXPORTS BY COUNTRY OF DESTINATION, 1921-22 TO 1930-31

| Crop year beginning July 1 | Total | Canada | Cuba | United Kingdom | All other countries |
|---|---|---|---|---|---|
| 1921-22 | 16.0 | 2.5 | .9 | 3.7 | 8.9 |
| 1922-23 | 18.5 | 1.5 | 1.2 | 4.2 | 11.6 |
| 1923-24 | 1.1 | .2 | .5 | .1 | .3 |
| 1924-25 | 11.0 | 3.8 | 1.3 | 1.2 | 4.7 |
| 1925-26 | 31.1 | 13.4 | 1.1 | 4.6 | 12.0 |
| 1926-27 | 9.2 | 5.2 | 1.2 | 1.2 | 1.6 |
| 1927-28 | 5.9 | 3.4 | 1.0 | .6 | .9 |
| 1928-29 | 10.9 | 6.5 | .9 | 1.2 | 2.3 |
| 1929-30 | 4.6 | 3.9 | .5 | .0 | .2 |
| 1930-31 | .9 | .7 | .1 | .0 | .1 |

*Source:* U. S. Department of Agriculture, Statistical Bulletin No. 29, *Statistics of Oats, Barley and Grain Sorghums,* and *Yearbook of Agriculture, 1932.*

*Imports.* Imports of oats have been insignificant, ranging from 85,000 bushels in 1927 (79,000 bushels of which came from Canada) to nearly seven million bushels in 1924 (of which all but 60,000 bushels originated in Canada). Outside of the Argentine imports in 1920, those from countries other than Canada are only a few thousand bushels yearly. Shipments from Sweden, for example, which aggregate only a couple of thousand bushels, are principally for seed, and do not compete directly with marketable feed oats.

The principal explanation for the large imports in 1921 and 1922 appears to be that some members of the grain trade in anticipation of impending tariff increases (the Emergency and the Fordney- McCumber Tariff Acts) imported more than the usual quantity. The increase in 1924 came as a result of the failure of the corn crop, which was the smallest in 23 years, and the resultant rise in domestic feed prices. Canada had harvested a record oat crop. Even so, in the aggregate in each crop year Canada has absorbed more American oats than she has exported to us.

TABLE 18

UNITED STATES OAT EXPORTS, IMPORTS, AND ANNUAL TRADE WITH CANADA, 1920-1931

(million bushels)

| Calendar Year | Total exports | Total Imports | Exports to Canada | Imports from Canada |
|---|---|---|---|---|
| 1920 | 12.9 | 6.7 | 1.2 | 6.4 |
| 1921 | 3.2 | 3.6 | 1.7 | 3.6 |
| 1922 | 30.0 | 1.3 | 2.4 | 1.3 |
| 1923 | 3.2 | .3 | .2 | .3 |
| 1924 | 4.0 | 7.0 | .8 | 6.9 |
| 1925 | 29.4 | .2 | 13.6 | .2 |
| 1926 | 11.6 | .2 | 3.6 | .2 |
| 1927 | 10.1 | .0 | 6.3 | .0 |
| 1928 | 10.4 | .5 | 6.3 | .5 |
| 1929 | 6.6 | .1 | 5.0 | .1 |
| 1930 | 1.5 | .2 | 1.1 | .2 |
| 1931 | 2.1 | .6 | 1.7 | .6 |

Note: During the period 1920-1930 exports absorbed approximately one per cent of the domestic production. Exports to Canada for the period 1920-1930 were considerable larger than imports from Canada. If crop years are used, domestic exports have in every year since 1920 exceeded imports.

*Source:* U. S. Department of Commerce, *The Foreign Commerce and Navigation of the United States.*

Exports to Canada clear through the Duluth-Superior, Wisconsin, Chicago, and Michigan customs districts; exports to other countries move via New Orleans or New York and other eastern ports. Imports, on the other hand, nearly all enter through the Buffalo Customs district, which also clears some exports. Hence, the oat movement in and out of the United States is essentially seasonal in character. A considerable quantity of the Canadian crop moves across the deficit feed area of the United States enroute to the coast for export. This movement is significant in an analysis of the effect of the tariff on domestic prices. The grain moves in bond, and may be absorbed

by the domestic market whenever the United States price exceeds the Canadian price by the amount of the duty.

Table 19 shows the year-to-year movement of Canadian oats via United States ports. Most of the Canadian exports have cleared through Canadian ports, following the cheaper all-water outlet through the Welland Canal, over Lake Ontario, and down the St. Lawrence River to Quebec or Montreal. During the last few years shipments through the United States have averaged less than a half million bushels yearly. Over half of the Canadian barley shipments, on the other hand, have cleared through United States ports.

TABLE 19

COMPARISON OF THE AMOUNT OF CANADIAN OATS EXPORTED VIA CANADIAN AND UNITED STATES PORTS, 1920-21 TO 1930-31

(million bushels)

| Crop years | Total | Canadian Ports | United States Ports |
|---|---|---|---|
| 1920-21 | 25.8 | 21.0 | 4.8 |
| 1921-22 | 24.9 | 14.8 | 10.1 |
| 1922-23 | 23.4 | 15.0 | 8.4 |
| 1923-24 | 32.4 | 15.6 | 16.8 |
| 1924-25 | 33.8 | 21.7 | 12.1 |
| 1925-26 | 32.8 | 27.4 | 5.4 |
| 1926-27 | 6.2 | 5.8 | .4 |
| 1927-28 | 11.3 | 10.6 | .7 |
| 1928-29 | 12.8 | 12.6 | .2 |
| 1929-30 | 1.6 | 1.6 | .0 |
| 1930-31 | 7.4 | 6.6 | .8 |

*Source:* From *Report of the Grain Trade of Canada, 1931,* Canada Dominion Bureau of Statistics, Agricultural Branch.

## CHAPTER IX

## THE EFFECTS OF THE TARIFF ON OAT PRICES

DOES the oat tariff have any influence on the price of oats? Since oat exports exceed imports is not the tariff nominal, or do the small annual imports from Canada make the tariff a price factor? These and related questions will now be considered.

Both the United States and Canada are on an export basis. Theoretically, at least, our production of an exportable surplus every year since 1920 should indicate that domestic oats do not benefit from a tariff. A comparison of prices in the primary markets of the United States and Canada substantiates this hypothesis.

Oats, unlike commodities such as wheat and sugar, are not completely subject to the law of single price; that is, the price of oats, allowing for quality and freight differences, is not the same throughout the country. Local surpluses and scarcities make many more or less independent markets, whose prices are determined only partially by national conditions, and reflect largely local supply and demand. Such local markets are found in western United States and Canada, and in the United States east of Buffalo. For example, farmers in Minnesota, North Dakota, Montana, or in the New England States may need small quantities of feed or seed oats, while their Canadian neighbors have the necessary surpluses to satisfy these requirements. In another locality the entire set-up may be reversed, with the oats moving into Canada. During the crop year 1926-27 the western division of Canada imported from the United States 4,300 bushels, and exported to this country 1,700 bushels. These strictly local adjustments are in themselves unimportant and can hardly be considered factors influencing the primary markets, but they do account for local price variations.

Of some importance are the temporary seasonal scarcities experienced by dairymen and other buyers in some of the eastern states. While there may be an abundance of oats in the north central states, this apparent seasonal feed shortage, usually occurring in the winter, may be met by importing some Canadian oats, which may be in bond either in transit or in storage in the United States.

There are several reasons why the oat price structure is not as uniform throughout the United States as that of some other com-

modities. (1) Oats are bulky. It is generally held that the greater the bulk of a commodity, other considerations being equal, the less sensitive is the price adjustment between markets. Wheat and flaxseed markets are noticeably more integrated than the primary coarse feed grain markets—barley, oats, and corn. (2) The loose organization of markets and the sluggishness of the trade tend to operate against a uniform price. Oat trade channels are not as well developed as those of wheat or even corn. (3) The domestic price for all sections of the United States is not necessarily fixed by the marginal export demand. Only about one per cent of the usual crop is sold abroad, and empirical analysis indicates that this one per cent does not fix the entire domestic price. (4) Transportation costs vary according to seasonal considerations. Since water transport from Duluth to Buffalo costs only a fraction of rail transport, Duluth grain firms endeavor to store oats to meet the anticipated needs of the lower lake region. If these needs turn out to be greater than the stock in store, prices during the season of closed lake navigation will have to cover the higher rail transportation costs.

At Buffalo oats are imported at one season and exported at another. This seasonal movement is caused by transportation costs, the bulkiness of oats, the sluggishness of the markets, and other factors already discussed. The United States Tariff Commission compared Buffalo and Toronto prices, and showed that there was a seasonal widening of the spread between the two markets.[1] It would seem that some of this seasonal differential was due to the operation of the tariff, since the spread was somewhat wider under a 15-cent tariff duty (1906-1913) than under a 6-cent duty (1914-1916). Such a comparison has not been made for the post-war years for several reasons. In the first place available price data are incomplete: secondly, as Buffalo and Toronto are not key markets, these prices would at best reflect supply and demand in only a particular area. Finally, since United States imports during the last decade have been negligible, a study to ascertain the effect of the tariff on prices in a local region does not seem warranted. The general relationship of prices in the two countries will now be treated.

*Comparison of Prices.* Chicago and Winnipeg prices show a close similarity in their general movements. Prices in both markets usually move in the same direction, but do not maintain any definite

[1] "Oats and Oatmeal", *Agricultural Staples and the Tariff*, Tariff Commission Information Series No. 20, 1920, p. 93.

spread or differential. For most of the period from 1920 to 1930 Chicago prices were distinctly below Winnipeg; nevertheless, for short intervals, particularly in the crop year 1923-24 and during the Federal Farm Board stabilization operations, Chicago oats sold as high as 14 cents a bushel above Winnipeg (monthly average for April and June, 1924). In the main, the Minneapolis and Winnipeg differentials have been the same as those between Chicago and Winnipeg.

*Comparability of Oat Grades.* The validity of a tariff price analysis often turns upon the degree of comparability of the grades used. One of the most difficult elements of price comparison is to obtain grades in the foreign and domestic market which are about equal in physical characteristics or intrinsic value.[2]

In the opinion of the trade and according to the statements of persons outside the trade who are familiar with the Canadian and American grain, No. 3 White Oats of the United States are about comparable to No. 1 Feed Oats of Canada. The following price comparison is made on this basis.

*Chicago and Winnipeg Cash Prices.* Chicago and Winnipeg dominate the trade of their respective countries; a price comparison of the two should be an acceptable index of the general price relationships between the United States and Canada. Chicago leads the United States not only in oat receipts, but likewise in volume of futures trading, with from 80 to 90 per cent of the total.

No attempt is made here to adjust the price differentials between Chicago and Winnipeg for transportation, seasonality, or concealed

[2] The Cargill Grain Company, Minneapolis, gives the following opinion: " . . . the United States grade No. 3 White Oats is between the Canadian Grades of No. 1 Feed Oats and No. 2 Feed Oats. I think your No. 3 grade is better than Canadian Grade No. 2 Feed but not quite up to the standard of No. 1 Feed."

The Department of Trade and Commerce, Board of Grain Commissioners for Canada state:

"it appears . . . that Western Canada No. 1 Feed Oats compare very well with United States No. 3 White Oats. Western Canada No. 1 Feed Oats are required to weigh 34 lbs. to the bushel, may contain 14 per cent moisture and approximately 92 percent cultivated white oats, about ¼ of 1 per cent of heat damaged oats, may contain 8 per cent of other domestic grain, or 7 per cent of wild oats and seeds—seeds not to exceed 3 per cent."

Mr. J. B. Graig of the Winnipeg Grain Exchange gives this opinion:

"United States No. 2 and No. 3 White Oats would be about equal in value to Western Canada No. 1 and No. 2 Feed Oats. In my opinion, grade for grade, Western Canadian excells United States grain of the same kind, as our land is not nearly so exhausted and our climatic conditions are more favorable for the production of grains containing the maximum of desirable factors."

factors. The differential is usually in favor of Winnipeg, but occasionally shifts in favor of Chicago. Unlike flaxseed, where the tariff is clearly a price factor and a measurable price spread is maintained, oat prices in these two primary markets follow similar general oscillations without any definite differential. For the 11 years studied, Chi-

ANNUAL OAT PRICES OF CHICAGO AND WINNIPEG COMPARED

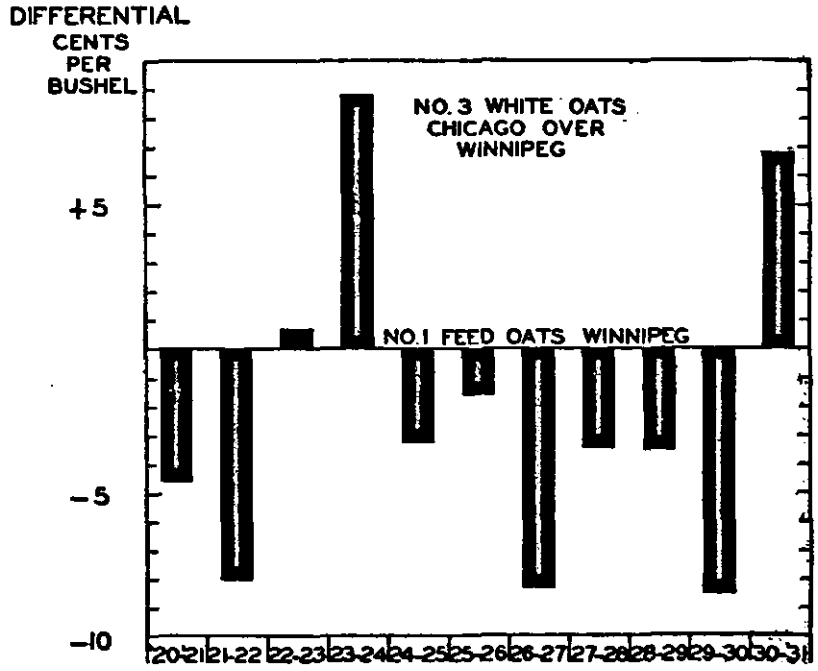


FIGURE 11. With two exceptions, Chicago oat prices averaged less than those at Winnipeg. The 1922-23 and 1923-24 reversal in price position is attributable to the three short oat crops and poor corn crop of the United States and the extraordinarily large oat crop of Canada in 1923. The 1930-31 price position arose out of the operations of the Federal Farm Board.

cago prices were below Winnipeg except in the crop year 1923-24 and during the Farm Board operations in 1930-31. The correlation of imports with the differential over Winnipeg prices infer at least that the tariff is not a continuous element in the price of domestic oats. It is difficult to establish any actual influence of the tariff on domestic prices even in the two periods when Chicago prices were above Winnipeg. Members of the grain trade feel that the duty on oats was nominal; it did not enter into their estimate of what

domestic prices should be. Yet the wide margin of Chicago prices over Winnipeg in 1923-24 intimates, at least, that the tariff was at that time partially effective.

MOVEMENT OF CHICAGO AND WINNIPEG
OAT PRICES

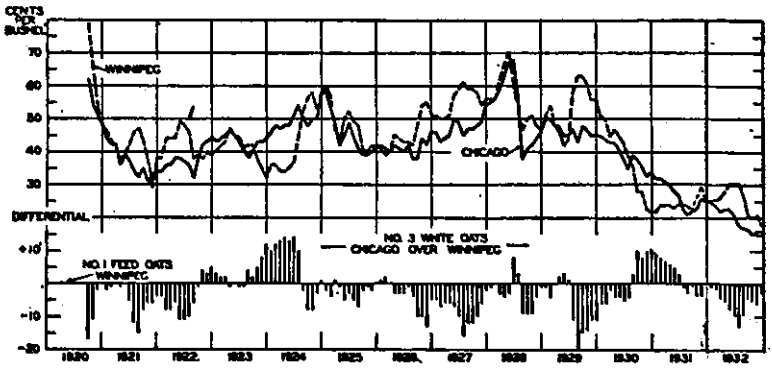


FIGURE 12. Although the secular and annual movement of oat prices at Chicago and Winnipeg are usually in the same direction they show less similarity than observed for barley.

*Supply Elements in 1923-24.* The market supplies of both Canada and the United States following the 1923 crop were unusual; the resultant relationships extraordinary. Canada harvested the biggest oat crop in its entire history (564 million bushels), whereas the United States had had three successive crops which were "below average". As a result, imports rose to over four million bushels from July 1, 1923, to July 1, 1924. Imports continued during the following year, partly as a result of the short domestic corn crop of 1924, and partly because of deliveries on contracts made earlier in the year. The cumulative effect of the small crops of 1921, 1922, and 1923 was a marked upward trend in prices. With the extraordinarily short corn crop of 1924, oat prices continued to climb in spite of the large oat crop of that year. In 1924 the corn scarcity was clearly the governing price factor.

*Activities of the Federal Farm Board.* The fact that Chicago oat prices for 1930-31 averaged nearly 7 cents a bushel above Winnipeg was due to the operations of the Farm Board. While it made no direct attempt to influence the price of feed grains, it was, nevertheless, indirectly instrumental in maintaining all domestic grain prices

above those of Canada. Its wheat stabilization operations were responsible for the unusually wide price differentials that resulted in the case of both oats and barley. From September, 1930, to January, 1931, inclusive, Winnipeg prices averaged 10 cents a bushel below Chicago. The total imports in 1930-31 were less than a million bushels, although prices were as favorable for importation as they were in 1923-24, when four million bushels were imported. The change in the tariff from 15 to 16 cents per bushel does not alter the comparison. By July, 1931, Chicago quotations were again below Winnipeg, and there were no imports. The operations of the Federal Farm Board properly fall into the monopoly category and as such are subject to the general limitations circumscribing monopoly prices.

TABLE 20

AVERAGE ANNUAL DIFFERENTIALS OF CASH OAT PRICES OF CHICAGO OVER WINNIPEG, 1920-21 TO 1930-31

(cents per bushel)

| Crop year beginning August 1 | Chicago over Winnipeg |
|---|---|
| 1920-21 | —4.6 |
| 1921-22 | —8.0 |
| 1922-23 | .7 |
| 1923-24 | 8.8 |
| 1924-25 | —3.2 |
| 1925-26 | —1.6 |
| 1926-27 | —8.3 |
| 1927-28 | —3.4 |
| 1928-29 | —3.5 |
| 1929-30 | —8.5 |
| 1930-31 | 6.8 |

*Source:* Compiled from U. S. Department of Agriculture, *Yearbook of Agriculture*, 1931, and Canada Dominion Bureau of Statistics, *Report of the Grain Trade of Canada.*

*Chicago and Winnipeg Oat Futures Prices.* Futures price differentials give virtually the same results as those of cash prices, although, measured by monthly highs and lows, they appear somewhat more stable. Their stability makes futures a somewhat better index of the general relationship of the two markets than cash prices. The conclusion, however, is the same: the tariff on oats has not been a direct price factor except for the year 1923-24. Futures prices are not as yet available for the period of the operations of the Federal Farm Board.

The theoretical advantages and practical difficulties of employing futures to measure a differential has been fully discussed in an earlier section.[3] In the case of oats, futures have some advantages over a cash price. The futures market of Chicago is a well developed institution; the yearly volume of oats futures trading since 1920 has ranged from 800 to 2,650 million bushels. Futures prices tend partially to eliminate several factors, namely, difference in seasonality, month-to-month variations in quality within a given grade, and short-time corners. This does not imply that futures prices tend to stabilize cash prices.[4]

The oat futures prices of Chicago and Winnipeg have been adjusted to make them as nearly comparable as possible, on the assumption that No. 3 White Oats at Chicago are comparable to No. 1 Feed Oats at Winnipeg. No 1 Feed Oats is accepted in fulfillment of futures contract at Winnipeg at a 5 cent per bushel discount, while No. 3 White Oats is discounted at 15 cents per bushel when delivered upon a futures contract at Chicago. The continuous line running through the bars of Figure 20 shows the futures price differentials of Chicago over Winnipeg. The average annual futures price differential was negative for every year excpt 1923-24, when Chicago

[3] See pp. 36-38.

[4] "The analysis of annual or near annual fluctuations as measured by the range (or difference between high and low) leads to no definite conclusion in favor of either cash or futures as regards degrees of stability, nor in favor of one or another grain. On the face of the annual data for annual ranges, cash makes the poorer showing—that is, the difference between high and low is greater; but much of this result can be explained by the factor of seasonal variation. The data do not indicate that futures are more stable than cash or that they are able to lend stability to the latter.

"An examination of monthly ranges indicates that cash grain is less stable than the futures in this particular phase of their movements, with a possible exception with regard to oats. The cash monthly ranges, however, are somewhat affected by the usual seasonal cycles (as well as perhaps to some extent by difference in quality), while there is no reason why futures should show any regular seasonal variation. A comparison of ranges by days for cash and futures is invalidated by effects of difference in quality upon the range for cash.

"Certain data of day to day changes . . . show the futures to be less stable than the cash, or possibly merely more sensitive . . . It cannot be claimed that the results of the foregoing studies and comparisons of price movements leads to a definite conclusion one way or the other regarding the alleged tendency of futures to operate as a stabilizing influence upon prices . . . . It seems to be conclusively proven . . . that future trading under existing conditions itself generates certain elements of risk and uncertainty. In other words, it causes some fluctuations. Its stabilizing influence must, therefore, depend upon its stilling or checking other causes of fluctuation that are more important than those it creates."

Report of the Federal Trade Commission on *The Grain Trade*, Vol. VI, *Prices of Grain and Grain Futures*, 1924, pp. 257-264.

had a favorable margin of 7.2 cents per bushel. Data for 1930-31 when available will undoubtedly show Chicago futures above those of Winnipeg.

CASH AND FUTURE PRICE DIFFERENTIALS OF OATS BETWEEN CHICAGO AND WINNIPEG

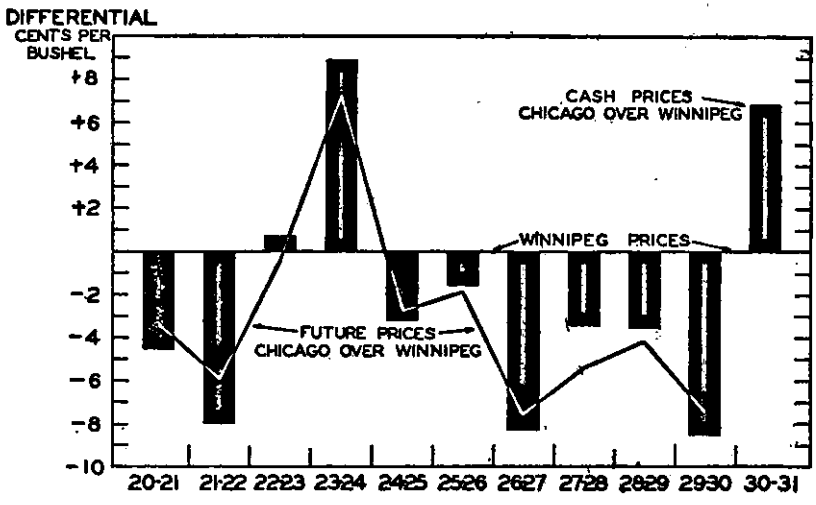


FIGURE 13. The annual average price differentials of oats between Chicago and Winnipeg whether measured by cash or futures quotations are practically the same. Differentials for future prices show somewhat less fluctuation.

TABLE 21

AVERAGE ANNUAL DIFFERENTIALS OF CHICAGO OAT FUTURES PRICES OVER WINNIPEG, 1920-21 TO 1929-30

(cents per bushel)

| Crop year beginning August | Chicago over Winnipeg |
|---|---|
| 1920-21 | —3.4 |
| 1921-22 | —6.0 |
| 1922-23 | —0.3 |
| 1923-24 | 7.2 |
| 1924-25 | —2.8 |
| 1925-26 | —1.8 |
| 1926-27 | —7.6 |
| 1927-28 | —5.4 |
| 1928-29 | —4.2 |
| 1929-30 | —7.5 |

*Source:* Both Chicago and Winnipeg quotations taken from Canada Dominion Bureau of Statistics, *Reports of the Grain Trade of Canada.*

*Minneapolis and Winnipeg Oat Prices.* In general, the price relationship between Minneapolis and Winnipeg has been the same as the Chicago-Winnipeg differentials already analyzed. Inasmuch as Minneapolis prices tend to be below Chicago, the only specific difference between the two comparisons is that the Winnipeg differential tends to be even greater in favor of Winnipeg than that of Chicago and Winnipeg.

Minneapolis-Winnipeg comparison is included because the supply elements back of each market are more nearly similar than between Chicago and Winnipeg. The surpluses of both markets move east over the same general route: Winnipeg's through Fort William and Port Arthur, and that of Minneapolis through Duluth to the Great Lakes. Likewise receipts at Minneapolis are more alike in their seasonality than those of Chicago and Winnipeg.

TABLE 22

AVERAGE ANNUAL DIFFERENTIALS OF MINNEAPOLIS CASH OAT PRICES OVER WINNIPEG, 1920-21 TO 1930-31

(cents per bushel)

| Crop year beginning August | Minneapolis over Winnipeg |
|---|---|
| 1920-21 | —7.6 |
| 1921-22 | —9.9 |
| 1922-23 | —3.0 |
| 1923-24 | 5.5 |
| 1924-25 | —5.7 |
| 1925-26 | —4.6 |
| 1926-27 | —8.7 |
| 1927-28 | —6.0 |
| 1928-29 | —5.7 |
| 1929-30 | —11.4 |
| 1930-31 | 6.3 |

*Source:* Both Minneapolis and Winnipeg quotations taken from Canada Dominion Bureau of Statistics, *Reports of the Grain Trade of Canada.*

These price comparisons indicate that Canada is in a better position to benefit from a duty on oats than is the United States, which conclusion is also borne out by the actual movement of oats. During the 10 years from 1921 to 1930 41 million bushels of American oats were consigned to Canada, while 13 million bushels of Canadian oats were imported. More than 11 of these 13 million bushels were imported in the first four years of the period.

The following factors which sometimes influence prices and the effectiveness of the tariff do not operate in the case of oats. (1) There is no oat production cycle. A production cycle like that of beef cattle may necessitate a shift from normal exports to imports in particular years. Oat crops show no tendency toward cyclical movements, although, like all cereal crops, they show rather sharp year-to-year fluctuations. Crop failures follow bumper crops in quite unpredictable succession. (2) Except for negligible quantities of seed there are no imports, nor is there a domestic scarcity of high quality grain. Quality variations do not affect the price of oats as they do wheat and corn, and barley prior to national prohibition legislation. Aside from the few thousand bushels imported yearly from Sweden as seed, few, if any, imports are on a quality basis. The United States usually has an abundance of good and poor oats at the same time. (3) There is no evidence of premeditated dumping of foreign oats, although there is probably some "concealed" dumping. The lower freights of Canada and the privileges enjoyed by bonded grain in store or in transit contain elements of concealed dumping, but these are of little significance in oats since such small quantities are actually imported. (4) Anticipation of the Fordney-McCumber Bill was a factor in the increase of imports in 1921-22. There is no evidence of such imports prior to the passage of the Smoot-Hawley Tariff Act of June, 1930.

*The Probable Effects of the Oat Tariff.* Normally, American producers are not benefited by the 16-cent per bushel duty on oats. First, for each crop year since 1920 exports have exceeded imports. From July, 1920, to August, 1931, 173 million bushels of oats were shipped out of the United States while only 15 million were imported. Second, domestic prices are usually lower than Canadian prices. The relationship of the two countries as portrayed by Chicago, Winnipeg and Minneapolis prices indicates that domestic oats tend to sell sufficiently below foreign prices to encourage some exports. Third, domestic prices are definitely conditioned by those of other feed grains, particularly corn and barley. Nearly 200 million bushels of corn (including the amount converted into lard and pork) are exported annually. Barley, too, is produced in exportable quantities. The relation of the prices of these three important feed grains indicates that substitution readily takes place. The inference is that since the prices of both corn and barley in the Buffalo feed deficit area are on an export basis, oats cannot sell above world prices.

But this generalization must be qualified. Under the extraordinary circumstances of 1923-24 it is possible that the oat tariff

was a regional price factor. The tariff at that time certainly did operate in the Buffalo area. The three small crops of 1921, 1922, and 1923, coupled with the record Canadian crop in 1923, materially increased imports, yet for the 1923-24 crop year as a whole exports were twice as large as imports. An acute shortage of feed grains will usually tend to make the tariff a localized price factor. Clearly the Farm Board grain stabilization operations were aided by the tariff's restriction of imports in the Buffalo and St. Lawrence region. Nevertheless, during the crop year 1930-31 exports were nearly five times as large as imports.

TABLE 23

UNITED STATES IMPORT DUTIES ON OATS

1883-1930

| Year | Tariff Act Paragraph | Classification | Rate of Duty |
|---|---|---|---|
| 1883 | 264 | Oats | 10 cents per bushel |
| | 266 | Oatmeal | .5 cent per pound |
| 1890 | 259 | Oats | 15 cents per bushel |
| | 260 | Oatmeal | 1 cent per pound |
| 1894 | 190 | Oats | 20 per centum ad valorem |
| | 190 | Oatmeal | 15 per centum ad valorem |
| 1897 | 230 | Oats | 15 cents per bushel |
| | 231 | Oatmeal and rolled oats | 1 cent per pound |
| | 231 | Oat hulls | 10 cents per 100 pounds |
| 1909 | 238 | Oats | 15 cents per bushel |
| | 238 | Oatmeal and rolled oats | 1 cent per pound |
| | 238 | Oat hulls | 10 cents per 100 pounds |
| 1913 | 192 | Oats | 6 cents per bushel of 32 pounds |
| | 192 | Oatmeal and rolled oats | 30 cents per 100 pounds |
| | 192 | Oat hulls | 8 cents per 100 pounds |
| 1922 | 726 | Oats hulled or unhulled | 15 cents per bushel |
| | 726 | Unhulled ground oats | 45 cents per 100 pounds |
| | 726 | Oatmeal ,rolled oats, oats grit and similar oats products | 80 cents per 100 pounds |
| 1930 | 726 | Oats hulled or unhulled | 16 cents per bushel |
| | 726 | Unhulled ground oats | 45 cents per 100 pounds |
| | 726 | Oatmeal, rolled oats, oats grit and similar oats products | 80 cents per 100 pounds |

# PART III CORN

## CHAPTER X

## THE CORN INDUSTRY

THE Smoot-Hawley Tariff Act of 1930 raised the duty on corn from 15 to 25 cents a bushel in the fifth tariff change since 1909. Farmers of the Corn Belt seem confused as to their probable benefits from the present tariff. There are two distinct views. One, which has been much emphasized politically, is that Argentina's low production costs make it possible for her to undersell us in our own markets, which, some claim, periodically breaks the American price. The other view is that the tariff on corn is at best only nominal, for the tariff alone is ineffective. The Equalization Fee and the Export Debenture were introducd in Congress to make the tariff effective, and though defeated gained a good deal of support from farmers and farm leaders.

Three out of every four farms in the United States produce some corn. It is the leading crop both in acreage and in value. From 1924 to 1929 the average annual value was over two million dollars. Only about a sixth of this total was realized as cash income. Corn is valuable chiefly as a feed; it is the raw material upon which the gigantic livestock industry of America is dependent, so that while it is not a cash crop, it is, nevertheless, of premier importance. Acreage increased rapidly up to 1910; it more than doubled from 1875 to 1900. The stimulus of war prices and contingent maladjustments resulted in 116 million acres in 1917, although for the last 20 years the crop has averaged about 100 million acres. Production has ranged from 2 to 3 billion bushels; although, except for the unusually small crops of 1924 and 1930, it has tended to approach the upper figure. The average from 1924 to 1930 was 2.6 billion bushels.

The United States produces 60 per cent of the world corn crop, which is about 4.5 billion bushels. Argentina is second in importance with 270 million bushels, or 6 per cent of the total; Russia, Brazil, Yugoslavia, and Italy each grow over 100 million bushels; and western Europe, from 500 to 600 million bushels. Around 300 million bushels, less than 7 per cent of the world crop, enter international

FARM PRICES, PRODUCTION, YIELD AND ACREAGE OF CORN

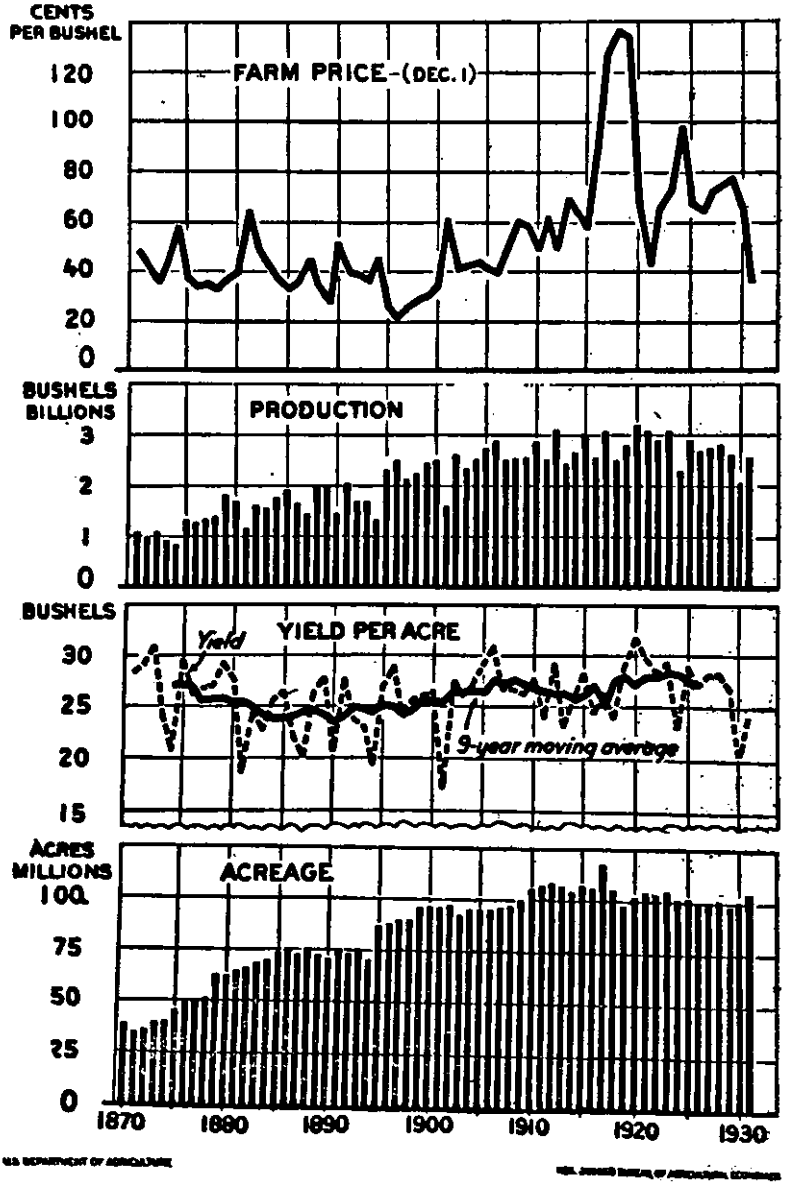


FIGURE 14. The large area suitable for corn production and the increasing demand for hog products accounts for the expansion of corn to 1910. Since then corn and hog surpluses have come to burden Corn Belt agriculture, but contraction is slow and difficult in spite of economic pressure.

commerce. Argentina exports 75 per cent of her corn; the United States less than one per cent. Insofar as there is an international market, it is dominated by Argentina.

PRODUCTION AND EXPORTS OF CORN
FOR SELECTED COUNTRIES

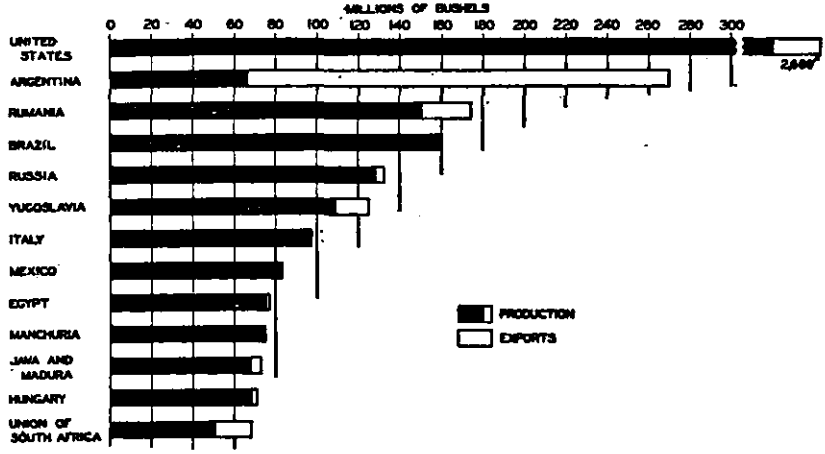


FIGURE 15. World production of corn is chiefly concentrated in the United States, but Argentina dominates international trade. Figure 15 is based on 1924–1929 averages.

Before the World War the United States practically set the world price. The United States Department of Agriculture in 1921 said that corn prices were determined in Chicago in the same sense that wheat prices are determined in Liverpool.[1] This opinion is borne out by corn exports. From 1895 to 1899 our average annual exports were 140 million bushels, as compared with 36 million from Argentina; during the next 10 years they were 111 million and 60 million bushels respectively. Since then the size of the Argentine crop has become the most important determinant of world prices.

The corn markets of the world are much less integrated than are those of wheat, cotton, wool, and butter. A sluggishness not known in many other farm commodities characterizes the price adjustment between domestic and foreign markets, since the grain does not enter international trade in large enough quantities nor with sufficient regularity to establish any close interdependence in international

[1] U. S. Deparment of Agriculture, *Yearbook of Agriculture, 1921*, pp. 217-218, carrys a chart of corn prices at Chicago, New York, and Liverpool from 1840 to 1921 which indicates that before the war Chicago prices led and those of Liverpool followed.

prices. This is well illustrated by the range in differentials between Buenos Aires and Chicago. In March, 1922, corn prices at Chicago averaged 57 cents a bushel and at Buenos Aires they were 79 cents, or 22 cents above Chicago. But in August and September, 1930, Chicago quotations averaged 99 and 94 cents respectively, while Buenos Aires prices were 56 and 51 cents, making a differential of 43 cents a bushel in favor of Chicago. Frequently within the year the price differences cover wide range. For instance, in 1924, Chicago opened the year from 5 to 10 cents below Buenos Aires, then moved up until it stood fully 40 cents above the Argentine market. What is true for the North and South American markets is also a fairly common occurance between them and European markets.

TABLE 24

AVERAGE PRODUCTION AND EXPORTS OF THE PRINCIPAL CORN PRODUCING COUNTRIES, 1924-1929

(million bushels)

| Country | Production | Exports | |
|---|---|---|---|
| | | Total | Per cent of Production |
| ESTIMATED WORLD TOTAL | 4,447[a] | | |
| United States | 2,686 | 23 | 1 |
| Argentina | 270 | 204 | 76 |
| Rumania | 175 | 24 | 14 |
| Brazil | 159[b] | | |
| Russia | 133 | 5 | 4 |
| Yugo Slavia | 125 | 16 | 13 |
| Italy | 98 | [c] | |
| Mexico | 83 | [c] | |
| Egypt | 77[b] | 2[c] | 2 |
| Manchuria | 75 | | |
| Java | 74[b] | 6[d] | 8 |
| Hungary | 71 | 3 | 4 |
| Union of South Africa | 68 | 17 | 25 |

[a] Estimated world production exclusive of China.

[b] Average 1924-28.

[c] From International Institute of Agriculture, *International Review of Agriculture.* Average from November 1, 1924, to October 31, 1929.

[d] Same source as [c]. Average from November 1, 1927 to October 31, 1929.

*Source:* Compiled from U. S. Department of Agriculture, Bureau of Agricultural Economics, Foreign Crops and Markets, and *Yearbook of Agriculture.*

Annual fluctuations in prices indicate that corn is exported in years of large production with resultant low domestic prices. In

recent years Europe has provided only an occasional outlet for United States corn. Mr. Taylor[2] is of the opinion that the American "price may set the upward limit of the world corn price, but the Argentine crop sets the downward limit". Chicago prices are not influenced significantly by European demand, except when the domestic surplus is large and corn unusually cheap.[3]

TABLE 25

UNITED STATES IMPORT DUTIES ON CORN, 1909-1930

| Tariff Act | Paragraph | Description of Commodity | Rate of Duty |
|---|---|---|---|
| 1909 | 235 | Corn or Maize | 15c per bu. of 56 pounds |
| | 236 | Corn meal | 40c per cwt. |
| 1913 | 465 | Corn or Maize | Free |
| | 466 | Corn meal | Free |
| 1921 | 4 | Corn or Maize | 15c per bu. of 56 pounds |
| 1922 | 724 | Corn or Maize including cracked corn | 15c per bu. of 56 pounds |
| | | Corn grit, meal, and flour and similar products | 30c per cwt. |
| 1930 | 724 | Corn or Maize including cracked corn | 25c per bu. of 56 pounds |
| | | Corn grits, meal, flour and similar products | 50c per cwt. |

[2] Taylor, Alonzo, E., *Corn and Hog Surplus of the Corn Belt,* Stanford, Calif., 1932, p. 190.

[3] Shephard, Geoffrey, S., *The Secular Movement of Corn Prices.* Agricultural Experiment Station, Iowa State College, 1931. Research Bulletin No. 140, pp. 192 and 217-18.

## CHAPTER XI

## ARGENTINE CORN

THE duty on corn was raised to 25 cents a bushel, presumably to reduce importations from Argentina. Nevertheless, small inports have continued, and although their price influence is negligible, their political significance is considerable. Many Corn Belt farmers, believing Argentine production to be a primary price influence, are afraid of Argentine competition.

The United States and Argentina are the only corn exporters of the western hemisphere. Both Canada and Mexico are deficit areas, and both buy from us. In recent years the bulk of our exports has gone to Canada; and nearly a tenth is consigned to Mexico, which, although eighth in world production, does not produce enough corn to meet domestic requirements. Brazil may become an exporter of corn, but as yet little of her 160-million bushel crop is sold abroad.[1] In any case Argentina is our sole direct competitor, and although her production is only a tenth as large as ours, her exports dominate world trade with a volume eight times that of ours. From 1926 to 1930 nearly 80 per cent of her corn was exported.[2] The bulk of these exports is shipped to the Portuguese and Spanish possessions, while virtually all of the rest is taken by European countries. Of the total exports in 1924, only one per cent came to the United States; in 1925, 1.5 per cent; and in 1926, .04 per cent.

Both production and acreage in the United States and Argentina may be thought of in ratios of 10 to one. The United States plants 100 million acres; Argentina, 10 million. The Parana Valley, Argentina's Corn Belt, is as yet only partly cultivated. Its population is sparse, and the area is still in the expansion stage. Increased production is probably more likely there than in any other zone of

[1] In 1927 we imported 80,000 bushels of Brazilian corn. While available data on the export trade of that country are unsatisfactory, the fragmentary references made by the *International Review of Agriculture* to Brazilian corn indicate that not more than a few hundred thousand bushels are exported yearly.

[2] There are several reasons for Argentina's dominance in the export trade. Livestock is fattened on alfalfa and the population is too sparse to consume much of the corn at home. The hog industry, which in the United States consumes 50 per cent of the corn produced, is undeveloped. But the chief factor is the land system of Argentina, whereby the large landowners rent out their land to tenants. The independent farmer, so common in the United States is rare in Argentina. See Jefferson, Mark, *Peopling of the Argentine Pampa*, for a succinct discussion of the maize industry of Argentina.

the world. About 50,000 square miles of the Parana Valley are under cultivation.[3]

TABLE 26

UNITED STATES AND ARGENTINE CORN PRODUCTION
1920-21 TO 1931-32
(million bushels)

| Crop year | United States | Argentina |
|---|---|---|
| 1920-21 | 3,210 | 230 |
| 1921-22 | 3,070 | 180 |
| 1922-23 | 2,910 | 180 |
| 1923-24 | 3,051 | 280 |
| 1924-25 | 2,310 | 190 |
| 1925-26 | 2,920 | 320 |
| 1926-27 | 2,690 | 320 |
| 1927-28 | 2,760 | 310 |
| 1928-29 | 2,820 | 230 |
| 1929-30 | 2,610 | 250 |
| 1930-31 | 2,080 | 370 |
| 1931-32 | 2,560 | 270 |

*Source:* U. S. Department of Agriculture, *Yearbook of Agriculture, 1932,* and trade sources.

*Violent Production Fluctuations.* Production in Argentina fluctuates violently, falling, for example, from 175 million bushels in 1910 to 28 million in 1911 and rising to 296 million the following year. Production in the United States knows no such catastrophic changes. Since 1910 the Argentine output has ranged from 28 to 325 million bushels, a change of over ten-fold. These fluctuations are due to extreme weather changes; rainfall is irregular and later in the season than that in the American Corn Belt. Years of both excessive drouth and excessive rainfall occur.[4] In 1911 the yield was only 3.4 bushels

[3] The corn region of Argentina occupies about the same position south of the Equator as that of the United States north of it. The crop year is, therefore, the reverse of ours. Corn is grown near the Parana River in the southern part of the province of Santa Fe, in the northern part of the province of Buenos Aires, and in the province of Cordoba west of Santa Fe. The lower part of the Parana Valley resembles Oklahoma and Kansas in latitude and in the climate of the growing season. Argentine corn land is flat, covered with native grasses, alfalfa pastures, and grain fields, and provided with excellent transportation facilities. The Plata estuary and the Parana are of the utmost value to the external trade of Argentina. Whitbeck, R. H., and Finch. V. C., *Economic Geography,* New York, 1930, pp. 301-15. Smith, J. Russell, *Industrial and Commercial Geography,* New York, 1925, pp. 109-10.

[4] At St. Vincents, in the Province of Buenos Aires, the average rainfall is 32 inches. In 1910 only 13 inches were recorded, while in 1914 70 inches fell. Rainfall is the chief factor in production changes.

per acre, while in 1915 it was 33.8 bushels, an average higher than any the United States has enjoyed. In 1916 it dropped to 16 bushels per acre.

TABLE 27

AVERAGE PRODUCTION AND EXPORTS OF ARGENTINE CORN FOR FIVE-YEAR PERIODS, 1901-1930.

(million bushels)

| Period | Production | Exports | |
|---|---|---|---|
| | | Total | Percent of Production |
| 1901-1905 | 130[1] | 70[2] | 54 |
| 1906-1910 | 150 | 80 | 53 |
| 1911-1915 | 220 | 140 | 64 |
| 1916-1920 | 170 | 90 | 53 |
| 1921-1925 | 210 | 120 | 57 |
| 1926-1930 | 290[3] | 230[3] | 79 |

*Sources:* [1] U. S. Department of Agriculture, *Yearbook of Agriculture, 1928, Statistics of Grain.*

[2] U. S. Department of Agriculture, *Statistical Bulletin No. 28, Corn Statistics,* pp. 97-98.

[3] Compiled from International Institute of Agriculture, *International Review of Agriculture,* Part III, "Monthly Crop Report and Agricultural Statistics."

*Comparability of United States and Argentine Corn.* The comparative use value of Argentine and American corn is hard to determine. The Argentine crop is predominantly flint, while that of this country is of the dent variety. Flint corn is generally considered too hard for livestock feed, but is quite suitable for poultry, and is in some demand as pigeon feed. In the manufacture of corn starch and other corn products, the two varieties are equally valuable. There appears to be no difference in their chemical composition, although flint corn possesses less moisture than dent.[5]

Argentine corn entering the eastern part of the United States is used in the manufacture of starch, glucose, and oil, some of which

[5] Two varieties of corn are grown in Argentina, one suitable for the export trade, and the other for feed and home use. Flint corn, such as the Red Piemontes, common yellow, 8-rowed Canario, and Longfellow varieties has several advantages for shipping. Because it is harder and has a lower moisture content than dent corn, it is less likely to heat when crossing the Equator than the softer dent varieties. One variety, Maiz Cuarenton (No. 40), is preferred for pigeon feed and chick feed because of the smallness of the kernels, and often sells at a premium over ordinary yellow corn in the United States. The varieties used at home are quite the same as our domestic corn and include such dent varieties as Silver King, Reid's Yellow, and Iowa Gold Mine. This corn, however, does not enter into our analysis, since it does not enter the foreign corn trade. U. S. Tariff Commission Report, *Corn or Maize,* p.8, October 23, 1928.

are later exported with the benefit of the draw-back provision, which will be discussed below. That entering the Pacific Coast ports is used for poultry feed. One feed dealer in California estimated that 15 per cent of the corn sold by his firm in 1925 originated in Argentina.[6]

There are no quotations on Argentine corn in this country; only at Liverpool are prices available for both United States and Argentine corn, and even there the quotations on the United States grain are often nominal because of the small volume of trade. Shipments declined to 17,000 bushels in 1929-30 and 13,000 bushels in 1930-31, while those from Argentine were 120 million bushels during the same

AMERICAN AND ARGENTINE CORN PRICES AT LIVERPOOL COMPARED

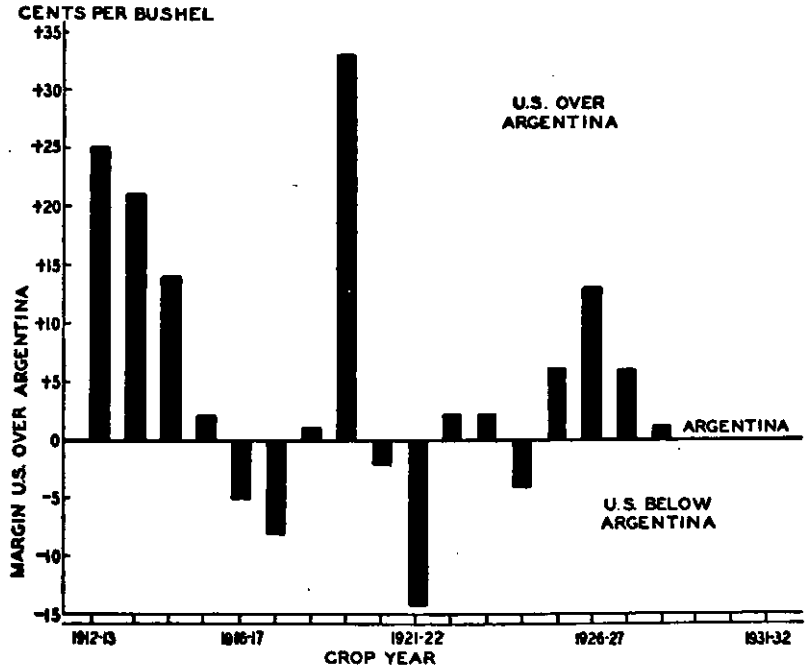


FIGURE 16. The extreme range in the price differentials shown for American and Argentine corn at Liverpool indicates that the dent corn from America and flint corn from Argentina cannot be freely substituted; furthermore, the two sets of prices are made in Chicago and Buenos Aires and not in Liverpool.

[6] Of the feed sold to poultrymen in California in 1925, 30 per cent was corn. The amount originating in California according to the estimates of poultry feed dealers ranged from 0 to 15 per cent. Dealers' estimates of the percentage coming from the Middle West ranged from 70 to 100 per cent. University of California, Agricultural Experiment Station Bulletin No. 413, pp. 42-43.

years. Clearly the price quotations on the latter are the more reliable.

Since the war Europeans have at times been willing to pay from 10 to 14 cents a bushel more for one grain than the other. In 1921 the average premium of Argentine over United States corn at Liverpool was 14 cents, while in 1926 United States corn was quoted at about a 13 cent per bushel premium. Before the World War it received even wider premiums, but in recent years the quotations have indicated no particular preference. Liverpool corn prices, unlike wheat quotations, are largely a reflection of Chicago and Buenos Aires prices. These markets are only loosely integrated.

The spread between these two corns since 1920 has showed a range of nearly 30 cents a bushel, which suggests the degree of substitution actually existent. If their use values were similar their interchangeability would be greater. Both are used by Europ-

TABLE 28

AVERAGE ANNUAL LIVERPOOL PRICES OF UNITED STATES AND ARGENTINE CORN, 1912-13 TO 1928-29.

(cents per bushel)

| Crop year beginning November 1 | Liverpool Price | | Margin of United States over Argentina |
|---|---|---|---|
| | Mixed American[1] | Argentina La Plate[1] | |
| 1912-13 | 95 | 70 | 25 |
| 1913-14 | 96 | 75 | 21 |
| 1914-15 | 109 | 95 | 14 |
| 1915-16 | 140[a] | 138 | 2 |
| 1916-17 | 198 | 203 | — 5 |
| 1917-18 | 225 | 233 | — 8 |
| 1918-19 | 192[c] | 191 | 1 |
| 1919-20 | 199[c] | 166 | 33 |
| 1920-21 | 109 | 111 | — 2 |
| 1921-22 | 88 | 102 | —14 |
| 1922-23 | 104[a] | 102 | 2 |
| 1923-24 | 109[d] | 107 | 2 |
| 1924-25 | 119[f] | 123 | — 4 |
| 1925-26 | 101[b] | 95 | 6 |
| 1926-27 | 106[d] | 93 | 13 |
| 1927-28 | 123[b] | 117 | 6 |
| 1928-29 | 117[e] | 116[2] | 1 |

([a]) 11 months; ([b]) 10 months; ([c]) 9 months; ([d]) 8 months; ([e]) 6 months; ([f]) October, 1924—one month.

*Sources:* [1] U. S. Department of Agriculture, Statistical Bulletin No. 28, 1930, *Corn Statistics* pp. 135-36. [2] Data supplied through the courtesy of U. S. Department of Agriculture, Bureau of Agricultural Economics.

eans for the manufacture of alcohol and starch, and for poultry, hog, and cattle feed. The chief use of each is for feed, but Argentine corn is as much a distinct commodity from American corn as barley is from oats. Each possesses distinctive qualities which, at points of non-substitution, become measurable price factors.

# CHAPTER XII

## DISPOSITION AND MOVEMENT IN THE UNITED STATES

SOME Argentine corn is imported at the Atlantic and Pacific seaboards and some in Porto Rico. Farmers want increased tariffs to keep these markets for themselves. But in order to decide whether they are of any importance, we must understand the market structure which connects surplus and deficit areas. The corn trade of the United States is actually on an export basis, especially indirectly in pork and pork products. How then are the surpluses of Iowa and Illinois related to the Atlantic and Pacific seaboards? Does corn flow more easily into Canada, or as pork and pork products into England and Germany, than to some domestic points?

Even a cursory analysis of the corn trade shows that the United States is a bundle of many surplus and deficit areas loosely tied together by as many markets. At many points the price zones of two or more markets overlap, setting up intermarket competition. Contrary to popular opinion the Corn Belt is not uniformly a surplus producing region; large sections of it cannot meet local requirements. Iowa, the premier corn state, is no exception; it too, has well defined deficit sections. Nor is it correct to suppose that intermarket spreads are constant. There are year-to-year shifts in surplus and deficit regions which are reflected in intermarket differentials.[1]

It is well known that corn is not marketed at a uniform rate the year round. But these seasonal changes are of only secondary significance in evaluating the tariff. The effectiveness of a duty on a perishable commodity often turns upon the particular seasonality of the product, but this is not true in the case of most cereal crops since they may be stored without excessive deterioration.[2]

[1] Mr. Rex W. Cox in his study *Factors Influencing Corn Prices*, University of Minnesota Agricultural Experiment Station Technical Bulletin No. 81, 1931, found the distribution of the corn crop an important element in explaining the Chicago price. See also the author's study *Variations in Corn Prices Within Iowa*, Agricultural Experiment Station, Iowa State College, Ames, Iowa, April 1933. (Mimeographed report).

[2] Alonzo E. Taylor feels that there exists the possibility that imports will become seasonal because in the summer when American corn prices are highest those of Argentina are lowest. A study of the monthly imports of the past 10 years does not substantiate this view. Since both countries trade in futures this tendency is obviated. Taylor, Alonzo E., *Corn and Hog Surplus of the Corn Belt*, Stanford University, California, 1932, p. 134.

The long time influence of the tariff may be said to depend upon the so-called normal movements prevailing between surplus and deficit areas. Year-to-year crop movements vary widely because of the contraction and expansion of surplus and deficit regions with each year's production; the effect of these annual changes are best understood when compared with the average of a period of years.

*The American Corn Belt.* The most extensive region suitable for corn in the world is found in the United States; it forms a well defined wedge-shaped pattern across the upper Mississippi Valley, including all of Iowa, most of Illinois and Indiana, half of Ohio, large parts of Missouri, Kansas, and Nebraska, and smaller parts of South

GEOGRAPHICAL SITUATION OF THE CORN BELT

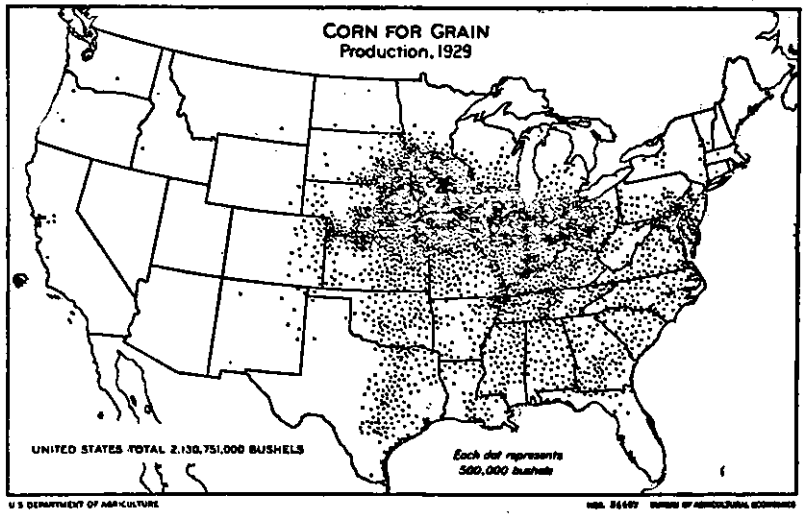


FIGURE 17. **The large central region of the United States known as the Corn Belt supplies the raw materials upon which the gigantic livestock feeding industry of that region depends.**

Dakota and Minnesota. The edge of the wedge rests in central Ohio, extending northwest to eastern South Dakota and west to the middle of Kansas. The nine states lying wholly or partly within this wedge produce nearly 70 per cent of the American crop.

Of the total production, 25 per cent is grown in Iowa and Illinois, the center of the Corn Belt. On the north and east this belt is bordered by regions where the shorter growing seasons and cooler summers enable small grains and grasses to compete with corn and finally to

replace it altogether. To the west, corn competes with wheat to the eight-inch line of summer rainfall. In the South corn, although widely grown, competes with cotton, and must take second place. Texas ranks tenth in production.[8]

*Geographical Location of the Corn Belt with Reference to Corn Deficit Areas.* The Corn Belt is surrounded by non-corn producing regions. North Dakota, northern Minnesota, Wisconsin, and Michigan are deficit areas. In the mountain states and on the Pacific and Atlantic coasts production is small. The South about supplies its requirements, so that shipments to it from the Corn Belt are light.

Since the Gulf States are self-supporting and the Mountain States, although a deficit area, are closer to domestic than to foreign corn, the competition of foreign grain is limited to the markets on the Atlantic and Pacific coasts.

*The Uses of Corn.* About 90 per cent of domestic production is fed to livestock. Its high carbohydrate content makes corn an efficient fat-producing feed, so that the Corn Belt has become the great hog and cattle feeding ground of North America. Half of the entire crop is fed to hogs, while an additional third is fed to cattle, horses and mules. Approximately 85 per cent is used upon the farm; 15 per cent of the usual crop is, then, available for distribution through established trade channels.

TABLE 29

AVERAGE CORN RECEIPTS AT PRIMARY MARKETS, 1926-27 TO 1930-31

(million bushels)

| Markets | Bushels | Per cent of total |
|---|---|---|
| TOTAL 10 MARKETS[a] | 236 | 100 |
| Chicago | 86 | 36 |
| Kansas City | 30 | 13 |
| St. Louis | 26 | 11 |
| Indianapolis | 23 | 10 |
| Omaha | 22 | 9 |
| Peoria | 21 | 9 |
| Remaining 4 markets | 27 | 12 |

[a] Includes Milwaukee, Minneapolis, Duluth, and Toledo.

*Sources:* Adapted from U. S. Department of Agriculture, *Yearbook of Agriculture*, 1932, *Statistics of Grain*, p. 709.

[8] See Whitbeck and Finch, *Economic Geography*, 1930, pp. 39-45, for brief yet thorough discussion of the geography of American corn.

*Commerce in Domestic Corn.* Three factors are operative in keeping corn on farms. (1) Its bulk makes long hauls uneconomical. (2) Animals are apparently more efficient in transforming feed into meat and meat products in the North Central States, the approximate area known as the Corn Belt, than they are in the South and East. (3) The dent corn cultivated in the United States has a high moisture content, and when stored or shipped long distances is subject to damage by fungi and fermentation.

By no means all of the corn that leaves the farm reaches the primary markets. Of the production of 2,600 million bushels (1926-1930) less than 10 per cent was received at the 10 primary markets, of which Chicago is the chief.

*Corn Movement out of the County Where Grown.* A fifth of the corn crop, approximately 500 million bushels, leaves the county of its origin. The quantity entering trade channels from year to year varies according to the size of the crop and the proportion of it that is marketable, among other factors.

TABLE 30

UNITED STATES CORN PRODUCTION, PER CENT OF CROP MARKETABLE, AND QUANTITY SHIPPED OUT OF COUNTY OF ORIGIN

1921-1932

(million bushels)

| Year | Production | Per cent marketable | Shipped out of county where grown |
|---|---|---|---|
| 1921 | 3,070 | 88 | 590 |
| 1922 | 2,910 | 88 | 520 |
| 1923 | 3,050 | 81 | 600 |
| 1924 | 2,310 | 66 | 420 |
| 1925 | 2,920 | 79 | 580 |
| 1926 | 2,690 | 71 | 450 |
| 1927 | 2,760 | 73 | 500 |
| 1928 | 2,840 | 83 | 540 |
| 1929 | 2,610 | 77 | 350 |
| 1930[a] | 2,090 | 79 | 310 |
| 1931 | 2,560 | 84 | 400 |
| 1932 | 2,908 | | 527 |

[a] U. S. Department of Agriculture, *Crops and Markets*, March, 1933.

*Source:* Adapted from U. S. Department of Agriculture *Yearbook of Agriculture* and Statistical Bulletin No. 28. *Corn Statistics.*

Table 31 shows the relative importance of the several corn producing states, measured by their average surplus. Of the total ship-

ments, over half originated in Illinois and Iowa; nine states supplied 87 per cent. Some of these shipments eventually find their way to the Atlantic and Pacific seaboard states, where they may compete with Argentine corn.

TABLE 31

CORN SHIPPED OUT OF COUNTY OF ORIGIN IN PRINCIPAL SURPLUS STATES, AVERAGE 1922-1926.

(million bushels)

| State | Shipments | Per cent of total |
|---|---|---|
| TOTAL | 510 | 100 |
| Illinois | 122 | 24 |
| Iowa | 102 | 20 |
| Nebraska | 56 | 11 |
| Indiana | 40 | 8 |
| Kansas | 27 | 5 |
| Ohio | 26 | 5 |
| Minnesota | 25 | 5 |
| South Dakota | 24 | 5 |
| Missouri | 20 | 4 |
| All Others | 68 | 13 |

*Source:* U. S. Tariff Commission, *Corn and Maize*, October, 1928, p. 6.

There are two important domestic surplus areas: one in Illinois, in a radius of about 150 miles from Chicago, and the other, the more important of the two, in northwest Iowa extending into Nebraska, South Dakota, and Minnesota. This latter region is characterized by the high grain acreage and relatively low percentage given to hay and pasture. The soil is highly productive and still comparatively unexploited. Farms are operated predominately by tenants, generally on the crop-share system, which usually leads to the selling of the landlord's share for cash.[4]

The movement of Iowa's surplus shows the annual shifts in deficit and surplus regions and the resultant changes in markets.[5] Bentley's study, which is based on actual railroad shipments but does not include other means of transportation, indicates that slightly less than 20 per cent of Iowa's crop enters out of county shipments. Half of these

[4] Holmes, C. L., *Types of Farming in Iowa.* Agricultural Experiment Station Bulletin No. 256, Iowa State College, January, 1929.

[5] Bentley, Ronald C., *The Movement of Iowa's Commercial Corn and Oats,* Bulletin No. 252, Agricultural Experiment Station, Iowa State College, July, 1928. A considerable part of this section is based upon unpublished data made available through the courtesy of Mr. Bentley.

shipments are to Iowa markets, and the rest, about 10 per cent of total production is actually shipped out of the state.

TABLE 32

SHIPMENTS OF IOWA'S COMMERCIAL CORN, 1925-26 TO 1928-29
(million bushels)

| Year | Production | Total County Shipments | | |
|---|---|---|---|---|
| | | Amount | Per cent of total | Percent of shipments consigned out of state |
| 1925-26 | 493 | 78 | 16 | 56 |
| 1926-27 | 435 | 82 | 19 | 44 |
| 1927-28 | 380 | 71 | 19 | 46 |
| 1928-29 | 461 | 89 | 19 | 54 |

*Source:* Data taken from unpublished manuscript prepared by Ronald C. Bentley.

A comparison of the Iowa corn movement for 1925-26 and 1926-27 illustrates the extraordinary year-to-year shifts that occur in markets and market areas. The 1925-26 crop was 15 per cent above normal. The crop to the west was average, to the east somewhat above normal, and to the south and southwest below. The markets outside Iowa received the following proportion of the total state shipments: Chicago, 24 per cent; Peoria, 4 per cent; and Minneapolis, 3 per cent. That year 56 per cent of all shipments were consigned to points outside of Iowa while the rest, 44 per cent, was consumed within the state. The following year the Iowa crop was normal. Missouri, Kansas, South Dakota, North Dakota, Colorado, and Wisconsin suffered short crops, while production in the South and East was about as usual. Shipments out of Iowa for 1926-27 took quite different courses from those of the preceding year. Chicago received 11 per cent; Missouri, 7 per cent; Milwaukee, 9 per cent; Peoria, 2 per cent; and Minneapolis, 5 per cent. There were corn shipments to all of the hundredth meridian states from North Dakota to Oklahoma. Receipts at Council Bluffs, Iowa, the corn outlet to the western states, increased from 13 per cent to 18 per cent of the total.

*The Illinois Surplus Area.* The surplus area of east central Illinois, extending into western Indiana, sells a considerable part of its corn. It has many characteristics in common with the surplus region already described; its soil is principally of a prairie type, much of which has been drained and put under cultivation in recent years; the proportion of tenant farmers is high.[6]

[6] Young and Elliott, *Types of Farming in Indiana*, Purdue University Agricultural Experiment Station Bulletin No. 342, June, 1930.

Corn from Illinois moves through two major channels, of which the more important is through Chicago to the east and to local manufacturing centers; of lesser importance is the movement toward the south. Chicago is the leading market of the state with Decatur, Indianapolis, Peoria, and St. Louis its chief competitors. Chicago receives 70 per cent of the corn shipped from northern Illinois; a fourth of the crop from the central part of the state goes to Decatur, 21 per cent to Chicago, and the remainder is divided quite evenly between Peoria, St. Louis, and Indianapolis.[7]

Only fragmentary data on the inter-state movement of corn are available. *Transportation on the Great Lakes,* 1930, by the United States War Department, and *Transcontinental and Intercoastal Trade of the Pacific Southwest,* 1926, by the United States Department of Commerce touch upon certain aspects of this movement for restricted areas.

Chicago receives about 40 per cent of the receipts at the 10 leading markets, of which it consumes a third. From 1920 to 1928, 80 of the 120 million bushels received at Chicago were again shipped out. Nearly all of this corn originates in Iowa and Illinois as is indicated in the following table.

TABLE 33

ORIGIN OF CHICAGO CORN RECEIPTS, 1923 AND 1928

(million bushels)

| State | 1923 Receipts | 1923 Per cent | 1928[a] Receipts | 1928[a] Per cent |
|---|---|---|---|---|
| TOTAL | 105.5 | 100 | 14.4 | 100 |
| Iowa | 68.7 | 65 | 4.7 | 32 |
| Illinois | 30.0 | 28 | 6.0 | 41 |
| South Dakota | 5.5 | 5 | .2 | 2 |
| Minnesota | .8 | 1 | .2 | 2 |
| Nebraska | .5 | 1 | .7 | 5 |
| Missouri | | | 1.6 | 11 |
| All Others | | | 1.0 | 7 |

[a] The 1928 data includes only those receipts which entered Lake shipments.
*Source:* U. S. War Department, *Transportation of the Great Lakes,* 1926, and Revised Report of 1930.

Milwaukee is also an important upper Lake corn market; local consumption is small, and most of the corn is reshipped. Shipments

[7] Stewart, Norton, and Rickey, *Market Destinations of Illinois Grain,* University of Illinois Agricultural Experiment Station Bulletin No. 315, September, 1928.

from Milwaukee, which are about three-fourths of receipts, go east as do those from Chicago, although nearly all the Milwaukee shipments are by water, while four-fifths of Chicago's are by rail. Half of the Great Lakes shipments terminate in Canada, either for Canadian consumption or for export from Montreal and Quebec.

TABLE 34

ORIGIN OF MILWAUKEE CORN RECEIPTS, 1923 AND 1928

(million bushels)

| State of origin | 1923 | | 1928 | |
|---|---|---|---|---|
| | Receipts | Per cent | Receipts | Per cent |
| TOTAL | 18.7 | 100 | 17.4 | 100 |
| Iowa | 10.4 | 56 | 9.8 | 57 |
| South Dakota | 3.0 | 16 | 2.7 | 15 |
| Minnesota | 2.4 | 13 | 2.3 | 13 |
| Nebraska | 1.7 | 9 | 1.6 | 9 |
| Illinois | .8 | 4 | .7 | 4 |
| Wisconsin | .4 | 2 | .3 | 2 |

*Source:* U. S. War Department, *Transportation on the Great Lakes, 1926,* and *Revised Report of 1930.*

*Corn Shipments to the Pacific Southwest.* The Department of Commerce in a study, *Transcontinental Trade of the Pacific Southwest* in 1926, gives some data on the origin of corn shipments to California, Nevada, Utah, Arizona, and New Mexico, the Pacific Southwest. In 1926 practically all of the 7,700,000 bushels of corn which moved into this deficit area originated in Iowa, Nebraska, and Kansas. No figures are available for the corn movement to the Pacific Northwest, including the important market of Seattle, nor for the Atlantic seaboard except that which was shipped via the Great Lakes.

## THE CORN-HOG RATIO

It is not amiss to emphasize the importance of the hog industry along with transportation as factors influencing corn market areas. The coarse feed grains, because of their inherent bulkiness, are decidedly more subject to transportation limitations than such grains as wheat, flaxseed, and rye. The corn farmer has two chief outlets for his crop; he may feed it to stock, principally to hogs, or he may sell directly for cash. The correlation of these alternative opportunities has given us the corn-hog ratio. Specifically, the corn-hog ratio means the number of bushels of corn which will equal in value 100 pounds of hogs. This ratio varies from time to time and from mar-

ket to market. During the last 25 years, about 11.4 bushels of corn, on the average, have equalled in value 100 pounds of live hogs in the Chicago market.[8] It is clear that if the price of hogs is relatively higher than the price of corn, it will be more profitable to breed sows and feed the corn to hogs than sell it as a cash grain. The expansion and contraction of the hog industry as farmers respond to the changes in the corn-hog ratio have resulted in a more or less cyclical movement in hog prices. Some such relationship between corn and hog prices is to be expected, since about half of the total corn production is fed to hogs. Moreover, this relationship is more apparent today than it was a decade ago, probably because a larger proportion of the crop is fed to hogs now than was formerly the case.

*Limitations on the Farmer's Response to Changes in the Corn-hog Ratio.* The influence of changes in the corn-hog ratio upon the movement of corn from farms to primary markets depends upon the degree to which farmers are in a position to take advantage of them. The farmer's response to changes in hog prices is limited by several factors. There is, of course, a clear functional relationship between corn and hog prices, but most writers have made the mistake of assuming that hog prices were dependent on corn prices which they considered as an independent variable.[9] It is doubtful, when corn and hog price data are once refined so as to ascertain regional and local influence upon supply and demand, that corn prices are nearly as independent of hog prices as studies thus far made seem to indicate.

Elliott gives three limitations on the Illinois farmer's response to a relative increase in hog prices: (1) lack of breeding stock at breeding time, (2) lack of capital, equipment, and facilities for handling hogs, and (3) "that farmers in different types of farming areas will not respond in their hog production to changes in given factors in the same way, for the reason that they are producing under different

[8] The corn-hog ratio for Iowa since 1919 has averaged 13.4 bushels. Western Iowa has a wider ratio than eastern Iowa; in general it may be said that the greater the cost of transportation to ultimate consuming markets the wider the ratio.

[9] "Practically, the corn crop can be treated as an independent variable in its relations to the hog situation of the same and later years . . . A big corn crop means cheap corn, whereas, conversely, a small crop means high-priced corn. The relations to acreage and yield are practically those due to their relation to crop. There is 64 per cent determination by crop, and exactly the same figure for determination by acreage and yield combined. It might be expected that the price of corn would be affected by the number of hogs on hand to be fed, since hog-feeding constitutes the most important variable factor in the demand for corn. Actually, however, the indications of such an effect are not very impressive." Wright, Sewall, *Corn and Hog Correlations.* U. S. Department of Agriculture, 1925, Bulletin No. 1300, p. 23.

conditions and financial circumstances."[10] The first two factors are of minor significance; the third is the important point. He found that a given change in the corn-hog ratio brings about a larger percentage change in hog production in east central Illinois than in any other section of the state. The farmers of this section are more likely to shift with changes in the corn-hog ratio from selling corn to feeding it than the farmers of western Illinois, the livestock section, or those in dairy section of the northern part of the state. Farmers in different sections of Illinois vary their output of hogs from year to year according to their own particular situations. The profitability of the farm as a going concern depends upon its organization, financial circumstances, equipment, and location, and these factors in combination are the chief limitations on the response of farmers to changes in relative hog prices. Their inability to judge market needs accurately is another large factor in the hog cycle.[11]

*Influence of the Freight Rate Structure.* Transportation costs play an important role in the elasticity of the supply of corn and hogs for any given section. Because of the unequal freight costs per unit of value for corn and hogs, the opportunity of Dakota or Nebraska farmers to shift is quite limited compared to that of farmers located nearer the central markets. In other words, corn, because of its bulk, is more expensive to ship than live hogs, so that corn-hog farmers operating near central markets can more easily take advantage of a change in the corn-hog ratio than those who are burdened by proportionally greater transportation costs. The shift and rapid expansion of the hog industry since 1920 into the northwestern part of the Corn Belt, which has been followed by a development of packing plants throughout the northern and western fringe of this area, can be attributed essentially to the post-war freight rate structures. Transportation on bulky commodities low in value such as corn and even unprocessed hogs has become so expensive as to be virtually prohibitive. Farmers far from market have been forced to concentrate their products, which they do by feeding their corn to livestock.

As is to be expected, the bulk of corn receipts at Chicago or any other primary market originates in the proximity of the market. It

[10] Elliott, F. F., *Adjusting Hog Production to Market Demand*, University of Illinois Agricultural Experiment Station Bulletin No. 293, p. 548.

[11] A recent study by Oris V. Wells, *Farmers' Response to Price in Hog Production and Marketing*. U. S. Department of Agriculture, Tech. Bulletin No. 359, April, 1933, throws considerable light upon the problem of geographical variations in the farmers' response-in-production-to-price. Of the six leading corn-and-hog states the Missouri response was found to be most elastic and the Nebraska response the least elastic. P. 24.

seems reasonable to conclude that when the corn-hog industry has attained a degree of stability, assuming also fixed freight costs about proportional to distance hauled, we should expect to see: (1) the cash corn areas developed near the primary consuming and processing markets. Corn for shipment east will originate in the Illinois and Indiana section of the Corn Belt. (2) At the other extreme of the corn producing region, the grain will be concentrated, chiefly in pork. This does not mean grain will necessarily be used on the farm where it is grown. It may be sold to neighboring livestock producers. The implication is that the larger of our two surplus areas will gradually dwindle in size. Some of the surplus today shipped east from western Iowa, eastern Nebraska and South Dakota, and southwestern Minnesota will be converted into more valuable products, of which hogs are only one, before being transported to the eastern consumer.[12]

To the extent that transportation costs condition the response of farmers to changes in hog and corn prices, it appears likely that three distinct regions will develop in the Corn Belt, assuming that the ultimate product must be shipped east for consumption. The eastern region will have little chance to shift in accordance with changes evidenced in the corn-hog ratio. Their farm practice will be to sell the corn for cash. This is now true of a large section near Chicago where many of the farmers raise only a few hogs. The farmers farthest west will in the main raise hogs no matter how much the prices in primary markets widen in favor of corn. Nebraska and the Dakotas fall into this region. Between these there will probably develop an area in which changes in the ratio will create price opportunities upon which the farmers may capitalize. Roughly, the Iowa region should find farmers in a fairly favorable position to shift; in fact, they can and do adjust their production to changes in the demand for hogs and corn. However, they are at present not the most elastic in their response. The importance of our foreign trade in corn, corn products, and pork to the corn-hog ratio is appraised in later sections.

[12] An excellent discussion of some of the economic aspects of the effect of freight rates upon agriculture is to be found in Professor M. R. Benedict's study, *Freight Rates and the South Dakota Farmer*. Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak. Bulletin No. 269. February, 1932.

# CHAPTER XIII

## SUBSTITUTION OF CORN FOR IMPORTED BLACKSTRAP MOLASSES[1]

IN the congressional debates on the Smoot-Hawley tariff bill there was considerable controversy over the possibility of substituting corn for imported blackstrap molasses in the manufacture of industrial alcohol. The purpose of a tariff on this commodity is to raise its price high enough to force the substitution of corn in the manufacture of industrial alcohol.[2]

During the last two decades there has been a shift from corn to molasses as raw material for alcohol production. The amount of molasses thus used increased from a little over 3 million gallons in 1901 to 42 million gallons in 1910 and 268 million gallons in 1929. The amount of corn used dropped from 19 million bushels in 1901 and 20 million in 1910 to less than 10 million in 1929. This shift is due to (1) the relative cost of the raw materials and (2) the relative cost of conversion.

Since about 2.5 gallons of molasses are required to produce one gallon of alcohol, and approximately 2.5 gallons of alcohol can be made from one bushel of corn, blackstrap molasses at 16 cents per gallon is equivalent to corn at one dollar per bushel as raw materials for alcohol production. A comparison of corn and molasses prices from 1920 to 1929 shows that only once, in 1920, did corn prices go below molasses. With corn prices around 80 cents per bushel and with molasses at 10.5 cents per gallon, there is an advantage of 5.75 cents per gallon of manufactured alcohol in favor of molasses.

Also the use of molasses has increased because of its relatively low cost of conversion. The best available information indicates that it cost from 3 to 5 cents more per gallon to produce alcohol from corn than from molasess, which, added to the difference in cost of raw

[1] In the preparation of this chapter I am indebted to Lippert S. Ellis for making available to me an unpublished manuscript, a part of his research on sugar.

[2] Blackstrap molasses is a by-product of sugar in all cane and beet sugar mills and sugar refineries. It is imported into the United States in greater quantity than either edible molasses or cane syrup. In this country it is used chiefly in the manufacture of ethyl alcohol, sweet feeds for livestock, and yeast. These three industries consume roughly the following amounts annually; alcohol, 200 million to 225 million gallons; stock feed 50 million to 75 million gallons; and yeast 20 to 25 million gallons. U. S. Tariff Commission, *Thirteenth Annual Report*, 1929, pp. 139-40.

materials, gives molasses a marked advantage. It should be pointed out, however, that the manufacture of alcohol from corn provides certain by-products which are normally of sufficient value to cover the difference in costs of conversion.

TABLE 35

BLACKSTRAP MOLASSES AND CORN USED FOR PRODUCTION OF ALCOHOL AND OTHER DISTILLED LIQUORS, 1910-1931

| Fiscal Year | Molasses (million gallons) | Corn (million bushels) |
|---|---|---|
| 1910 | 42 | 20 |
| 1911 | 44 | 23 |
| 1912 | 62 | 23 |
| 1913 | 65 | 24 |
| 1914 | 65 | 21 |
| 1915 | 123 | 14 |
| 1916 | 81 | 32 |
| 1917 | 112 | 34 |
| 1918 | 118 | 14 |
| 1919 | 123 | 4 |
| 1920 | 113 | 1 |
| 1921 | 119 | 5 |
| 1922 | 97 | 3 |
| 1923 | 149 | 3 |
| 1924 | 155 | 5 |
| 1925 | 203 | 7 |
| 1926 | 267 | 8 |
| 1927 | 212 | 8 |
| 1928 | 214 | 6 |
| 1929 | 268 | 10 |
| 1930 | 236 | 10 |
| 1931 | 188 | |

*Source:* U. S. Treasury Department, Bureau of Prohibition, *Statistics Concerning Intoxicating Liquors*, December, 1930, p. 63.

A tariff of 4 cents per gallon of molasses would give corn at 80 cents per bushel a slight advantage over molasses at 10.5 cents per gallon.[8] Nevertheless, it is doubtful whether a 4-cent, or even higher, tariff on molasses would materially increase the amount of

[8] The Tariff Act of 1922 placed a duty of one-sixth cent per gallon on all molasses imported for use other than the commercial extraction of sugar or for human consumption if testing not above 52 per cent total sugar. Prior to this these inferior grades of molasses had not been dutiable. The 1930 Tariff Act established the rate of 0.3 cents per pound of sugar on the type of imports into which blackstrap molasses falls. One gallon of blackstrap molasses weighs approximately 11.7 pounds. 52 per cent sugar content would mean about 6 pounds of sugar per gallon, which at the rate of .03 cent per pound would be a duty of .18 cents per gallon of molasses, a slight increase over the 1922 duty.

corn used in the production of industrial alcohol. The plants located at Pekin, Illinois; Lawrenceburg, Indiana; and Cincinnati, Ohio, would probably be stimulated to increased production and might even operate at full capacity. But the great majority of the 57 plants now using molasses as a raw material would in all likelihood continue to do so in spite of substantial tariff increases because of (1) freight costs from the Corn Belt to the alcohol plants, (2) the uncertainty involved in prospective governmental action, and (3) the possibilities of developing commercially profitable synthetic alcohol production.[4]

*Supply of Blackstrap Molasses.* Nearly all of our blackstrap molasses is imported, with about 65 per cent originating in Cuba. A tariff would, therefore, probably be quite effective in increasing the price. Even though domestic production increased while imports from Cuba were static, a higher or a prohibitive duty would enhance the price; but it seems unlikely that any reasonably high tariff would force most of the alcohol manufacturers to shift to corn.[5]

The principal plants now using blackstrap molasses as raw material are located along the seaboard, chiefly in Boston, New York, Philadelphia, Baltimore, New Orleans, and San Francisco. Louisiana, Maryland, Pennsylvania, and New Jersey lead in industrial alcohol production. The freight rate on shelled corn in carload lots from Peoria, Illinois, to New York City is 19 cents per bushel,[6] which would

[6] The freight rates from Iowa to the Atlantic seaboard is roughly 25 cents a bushel.

[4] "The production of synthetic alcohol from ethylene gas is a relatively new industry. The alcohol produced by this method, however, is considered sufficiently pure to be used in practically 90% of the preparations and processes now employing ethyl alcohol produced by the fermentation of molasses or grain. The cost figures are not known. Estimates range from 24 to 27 cents per gallon, which covers all expenses, including selling, denaturization, insurance, depreciation and overhead. Synthetic alcohol was equivalent to about 10% of the total industrial alcohol output for 1932. High production costs, as well as the considerable new capital investment required, have served to check a rapid expansion of this industry. A gradual expansion, however, seems assured. In time, it is possible that the production of alcohol from this source would be a serious competitor to both molasses and grain as raw materials." *The Use of Alcohol in Motor Fuels,* Progress Report No. V. Iowa State College, Ames, Iowa. April, 1933. Prepared by A. G. Black, G. S. Shepherd and J. J. Dalton.

[5] "Because of the present rather narrow outlet for molasses, producers are willing to accept any price which will net a slight return above the handling and transportation charges. It is a by-product of little value at its source of origin. This condition has served to give molasses a comparative advantage over corn or other possible raw materials for the manufacture of industrial alcohol . . . . The estimated total available supply of molasses of 1933 in the United States and those countries from whom we import the larger share of our requirements is 390 million gallons. The estimated consumption for 1933 is 255 million gallons or an excess of supply over demand of 145 million gallons." Black, Shepherd and Dalton, Iowa State College Progress Report, *op. cit.*

add 7.6 cents to the cost of a gallon of alcohol. The water rate from Cairo, Illinois, to New Orleans is around 11 cents per bushel. A tariff rate of about 8 cents per gallon on molasses would be needed to remove the freight barrier now prevailing between the Corn Belt and New York City.

According to the *New York Journal of Commerce*, the price of blackstrap molasses in tank cars at New Orleans declined from 12 cents per gallon early in 1930 to 7 cents during the latter part of 1930 and the beginning of 1931. During November and December, 1930, and January, 1931, No. 3 Yellow corn averaged 70 cents a bushel at St. Louis, which, plus the 11-cent water rate to New Orleans means 82-cent corn competing with 7-cent molasses. At these prices 17.5 cents worth of blackstrap molasses or 32.8 cents worth of corn would make one proof gallon of alcohol. In other words, during the latter part of 1930 at the point of actual competition corn was nearly twice as expensive as blackstrap molasses for alcohol production. Assuming full effectiveness, a tariff of slightly over 15 cents per gallon on blackstrap molasses would have been necessary to permit corn competition.[7]

TABLE 36

SOURCES OF SUPPLY OF BLACKSTRAP MOLASSES, 1922-1927

(million pounds)

| Year | United States production | Insular possessions | Cuba | Others | Total |
|---|---|---|---|---|---|
| AVERAGE | 49 | 30 | 177 | 18 | 274 |
| 1922 | 60 | 13 | 98 | 4 | 175 |
| 1923 | 44 | 22 | 169 | 16 | 251 |
| 1924 | 46 | 27 | 165 | 14 | 252 |
| 1925 | 53 | 42 | 227 | 21 | 343 |
| 1926 | 46 | 43 | 223 | 32 | 344 |
| 1927 | 42 | 30 | 182 | 24 | 278 |

*Source:* U. S. Tariff Commission, *Summary of Tariff Information, 1929, on the Tariff Act of 1922.*

Even though all domestic industrial alcohol were manufactured from corn, only 3 per cent of the crop, or 75 million bushels, would

[7] The Iowa State College Progress Report No. V., Black, Shepherd and Dalton, *op. cit.*, concludes that corn at 25 cents a bushel is about equivalent in making alcohol to molasses at 5 cents a gallon, and corn at 20 cents is equivalent to molasses at 4 cents a gallon. With the cheap corn prices that prevailed throughout the Corn Belt from the fall of 1932 to May, 1933, had the alcohol plants been situated in this area they would have found corn a cheaper raw material than molasses.

be so absorbed. How much this outlet would affect the price of the entire crop is, of course, problematical. With pork and pork products consistently exported, the price effect of substituting corn for blackstrap molasses in alcohol production may easily be over-estimated. Yet were it possible to establish an outlet for 75 million bushels of corn yearly by forcing a shift in raw materials used for alcohol production, prices would certainly be influenced.[8]

TABLE 37

UNITED STATES ALCOHOL PRODUCTION, AND CORN ESTIMATED NECESSARY FOR TOTAL INDUSTRIAL ALCOHOL PRODUCTION

1920-1929

| Fiscal Year | Industrial Alcohol Production (million proof gallons) | Corn needed for total industrial alcohol production[a] (million bushels) | Per cent of previous crop years |
|---|---|---|---|
| 1925-1929 AVERAGE | 184 | 74 | 3 |
| 1920 | 98 | 39 | 1 |
| 1921 | 85 | 34 | 1 |
| 1922 | 80 | 32 | 1 |
| 1923 | 122 | 49 | 2 |
| 1924 | 136 | 54 | 2 |
| 1925 | 166 | 66 | 3 |
| 1926 | 202 | 81 | 3 |
| 1927 | 184 | 74 | 3 |
| 1928 | 169 | 68 | 2 |
| 1929 | 201 | 80 | 3 |

[a] Assuming one bushel of corn to yield 2.5 gallons of alcohol.

*Source:* U. S. Treasury Department, Bureau of Prohibition, *Statistics Concerning Intoxicating Liquors*, January, 1930, p. 3.

In summary, post-war trends indicate that domestic corn cannot compete successfully with blackstrap molasses in the manufacture of alcohol. While the higher conversion costs of corn are offset by certain resulting by-products, transportation costs from the Corn Belt to the Atlantic coast, where nearly all of the alcohol plants are located, create an economic barrier thus far unsurmounted. With continued

[8] No mention has been made of the recent proposals whereby alcohol is to be used as a supplementary motor fuel. Needless to say that if a program were adopted requiring a 10 per cent alcohol blend for all gasoline used it would increase the demand for industrial alcohol extraordinarily. For example, with the gasoline consumption at 15 billion gallons a 10 per cent alcohol blend would require 1.5 billion gallons. With one bushel of corn yielding 2.5 gallons of alcohol this outlet would absorb 600,000,000 bushels of corn, if corn were the sole raw material. This represents 23 per cent of our usual corn crop. See Black, Shepherd and Dalton, Iowa State College Progress Report No. V., *op. cit.*

low prices of sugar and sugar products and high freight rates there appears to be little likelihood that alcohol manufacturers will substitute corn to any considerable extent. It is doubtful if a tariff on low grade molasses many times as high as the 1930 rate would force the substitution of corn. There remains the probability, however, that a limited quantity of the inferior grades of corn, when they run high in starch content, would be used when corn prices are low. In general the outlook for corn as a competitor of molasses, even with a high duty on molasses, is not promising.

# CHAPTER XIV

## EXPORTS AND IMPORTS OF CORN AND CORN PRODUCTS

CORN exports have declined from 100 to 200 million bushels in 1900 to 10 to 15 million bushels at the present time. Imports also are small, even when exports are lowest. At present about one per cent of the usual crop is sold in Canada, Cuba, and Mexico. Exports to the Eastern Hemisphere are negligible, though early in the century they were significant. Some corn oil, glucose, grape sugar, and corn starch are exported in even greater quantities now than before the World War. The influence on domestic prices of the demand for corn and corn products, although they are on an export basis, is very small; much more significant is the foreign trade in pork and lard.

A comparison of corn exports with production as an index of their importance is somewhat misleading. A better measure is the ratio of exports to shipments out of county of origin, or to market receipts. While exports were only 2.6 per cent of the 1921-25 production, they were 14 per cent of shipments from farms and nearly 30 per cent of primary market receipts. Since 1926 these percentages have decreased. The price influence of exports is probably somewhat greater than a comparison of exports and production suggests, but even so domestic prices are controlled essentially by domestic forces. Exports are the result of corn prices already set by domestic conditions; large crops and low prices mean increased exports. Investigators of the factors influencing corn prices have found the foreign demand of little or no effect.[1] Taylor feels that 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 . . . . We export, if at all, because we have a low domestic price . . . . As for the going price of corn

[1] Cox, Rex W., *Factors Influencing Corn Prices.* University of Minnesota Agric. Exp. Sta., 1931, Technical Bul. No. 81. Mr. Cox finds that the price of No. 3 Yellow corn at Chicago can be accounted for by the following factors: (1) corn supply, (2) distribution of the corn crop, (3) quality of the corn crop, (4) number of hogs, (5) production of oats and barley, (6) number of beef cattle. The last two were of only minor importance. Shepherd, Geoffrey S., *The Secular Movement of Corn Prices.* Agric. Exp. Sta., Iowa State College of Agriculture, 1931, Research Bul. No. 140. In Appendix V, pp. 217-18, Mr. Shepherd indicates that the export demand for corn rises with low domestic prices, but is apparently negligible when prices are normal.

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."[2]

Two-thirds of our corn exports go to nearby neighbors, chiefly Canada. From 1924 to 1928 exports to Canada averaged 7.5 million bushels annually out of the total 17.7 million bushels exported.. Cuba ranks second with 13 per cent, while Mexico, the United Kingdom, and the Netherlands take about 10 per cent each. These exports are shipped through three distinct channels, of which the largest is through the customs district adjacent to Canada. A second movement clears via the two Gulf ports, New Orleans and Galveston, and the third includes the Maryland, Virginia, Philadelphia, and New York customs districts. These figures include only corn and corn meal. However, about as much corn is exported in semi-manufactured or processed products like corn oil, corn starch, glucose, and grape sugar as in corn directly.[3]

*Corn Oil.* Corn oil is least important to the export trade. Exports have declined from about 20 million to less than one million pounds in recent years, because of an increase in domestic consumption, which has readily absorbed our increased production. Production expanded from less than nine million gallons in 1914 to 21 million in 1929.

*Corn Starch.* Immediately following the War corn starch exports stood around 100 million pounds annually; since then they have more than doubled. From 1925-1929 the average annual exports were 227 million pounds. Pre-war figures are not available, but production expanded from 570 million pounds in 1914 to 1,046 million pounds in 1929, indicating an increase in exports for the same period.[4]

[2] Taylor, Alonzo E., *Corn and Hog Surplus of the Corn Belt,* pp. 185-6.

[3] Grape sugar is a sugar made from corn. It is a joint end product from the manufacture of starch.

[4] U. S. Department of Commerce, *Statistical Abstract of the United States, 1930.*
Corn is the principal raw material for the manufacture of starch, with potatoes and wheat flour ranking second and third. Glucose and grape sugar are joint end-products. In 1914 out of 2,672 million pounds of starch (quantity gross) manufactured, corn, potatoes, and wheat flour ranked as follows:

| | | |
|---|---|---|
| Corn | 2,488 million pounds | 97.4 per cent |
| Potatoes | 169 million pounds | 1.6 per cent |
| Wheat Flour | 14 million pounds | 1.0 per cent |
| Total | 2,671 million pounds | 100.00 per cent |

A brief statement of the process followed in producing starch is as follows. Corn is first soaked in water impregnated with sulphurous acid. It is then ground into an emul-

(Continued on next page.)

*Glucose and Grape Sugar.* Before the World War the United States exported about 200 million pounds of glucose and grape sugar yearly. These exports have declined to around 150 million pounds annually for the period 1925-1929, although there has been little change in the trend since 1920. Production, on the other hand, has expanded most extraordinarily, rising from 174 million gallons in 1914 to 896 million gallons in 1929. In addition, 1,165 million pounds of corn syrup were manufactured in 1929.[5]

## Corn Imports

Although imports of corn had not reached a million bushels in any one year up to 1913, in that year 12 million bushels entered. The reasons for the increase were that (1) the smallest domestic crop in a decade was harvested; and (2) the Tariff Act of October, 1913, placed corn on the free list. After that year imports again decreased until the stimulus of the high prices in the early post-war period brought in 10 million bushels in 1919 and 6 million in 1920. Then came the drastic decline of domestic prices. Corn sold for less in Chicago than in Buenos Aires; imports stopped, and 5 per cent of

sion in a "fuss" mill, and passed through revolving silk screens, after which it is allowed to settle on a long run table. The green starch may be dried and purified if the object is starch, or subjected to further treatment if the object is glucose or grape sugar. In the latter case the green starch is made into a "milk" with water. The milk is pumped into a closed converter into which is injected boiling hydrochloric or sulphuric acid. Steam is let in at the same time and the pressure kept at about 25 pounds per square inch. The action of the acid breaks up the molecules of the green starch into dextrose, maltose, and dextrin. The longer the process continues the higher is the percentage of dextrose. Accordingly, if grape sugar is desired, the process of conversion is continued longer than for glucose. From *Tariff Information Surveys* on articles in paragraph 178, 179, 180 of the Tariff Act of 1913. United States Tariff Commission, Washington, D. C.

[5] Apparently the manufacture of corn syrup, corn oil, and starch with machine processes and large scale production is well adapted to monopoly control. In 1914 there were 89 establishments producing these products. By 1925 the number had dropped to 30. "In 1897 a consolidation of the principal glucose factories was effected. For several years it was highly successful, maintaining the price of glucose and paying large dividends on both preferred and common stock, though greatly over-capitalized." The last consolidation came in 1906 under the name of the Corn Products Refining Company. The U. S. Tariff Commission states that the Corn Products Refining Company has been able to meet foreign competition. The efficiencies of machine processes, capitalistic organization, and large scale production have made it possible for the American corn products manufacturer to compete successfully with foreign manufacturers. Inasmuch as the price of domestic glucose in general is no higher than the foreign price, the Corn Products Company has not followed a policy of dumping, according to the study of the U. S. Tariff Commission.

the 1921 crop was exported. At this point the Emergency Tariff Act of 1921 was passed, but at that time there were no corn imports seeking admittance.

Imports in 1921, 1922, and 1923 were negligible. The short crop of 1924 was followed by imports of four million bushels. About a million bushels entered in 1925 and 1926. The high prices of 1927, in spite of the 15-cent per bushel duty, attracted five million bushels. Since that time only small quantities have been imported. During this entire period, except for 1913, exports have exceeded imports. The average net exports for 1917-1926 were 48 million bushels annually, while for the five years 1922-1926 they averaged 33 million bushels.

TABLE 38

AVERAGE UNITED STATES FOREIGN TRADE IN CORN INCLUDING MEAL, FOR FIVE-YEAR PERIODS, 1900-1929.

(million bushels)

| Period[1] | Exports | Imports | Net Exports |
|---|---|---|---|
| 1900-1904 | 86.9 | .02 | 86.9 |
| 1905-1909 | 67.4 | .08 | 67.3 |
| 1910-1914 | 43.9 | 4.6 | 39.3 |
| 1915-1919 | 39.1 | 4.9 | 34.4 |
| 1920-1924 | 76.0 | 2.2 | 74.0 |
| 1925-1929 | 23.2 | 1.6 | 21.7 |

[1] Crop year beginning July 1.

*Source:* U. S. Department of Agriculture *Yearbook of Agriculture*, 1930, p. 626.

*Origin of Corn Imports.* Argentina supplies about 85 per cent of United States imports. However, if our inland possessions are included, our trade with the Argentine is no larger than that with the Dominican Republic, except in years of unusually small domestic supplies, such as 1924 and 1927. These two countries have accounted for over 90 per cent of all our imports since 1922. Occasionally we import negligible quantities from Canada, Brazil, Kwantung, and Venezuela. In normal years most of our imports enter Porto Rican ports, chiefly from the Dominican Republic. In years of unusually large imports some corn is received through New York and Buffalo, and Washington, Oregon, and San Francisco custom districts. Very little ever enters the southern ports.

*Porto Rican Corn Imports.* From 1922 to 1930 Porto Rican imports have been a third of the total for the United States (see Table 39). Obviously the barrier of transportation costs from the

Corn Belt to Porto Rico is much greater than to the deficit coast regions. Porto Rico imports virtually all her corn from the Dominican Republic.

TABLE 39
TOTAL CORN IMPORTS FOR UNITED STATES AND FOR PORTO RICO, 1922-1931

(thousand bushels)

| Calendar Year | Total imports | Imports through Porto Rico Customs District | Porto Rican imports as per cent of total |
|---|---|---|---|
| 1922 | 113 | 61 | 54 |
| 1923 | 203 | 122 | 60 |
| 1924 | 4,107 | 116 | 3 |
| 1925 | 1,086 | 204 | 19 |
| 1926 | 1,055 | 234 | 22 |
| 1927 | 5,458 | 201 | 4 |
| 1928 | 465 | 227 | 49 |
| 1929 | 407 | 205 | 50 |
| 1930 | 1,556 | 340 | 22 |
| 1931 | 618 | 278 | 45 |

*Source:* U. S. Department of Commerce, ***Foreign Commerce and Navigation of the United States.***

*Pacific and Atlantic Coast Corn Imports.* Imports at the Pacific Coast for consumption purposes were approximately twice those at Atlantic ports. From October, 1923, to February, 1928, the two regions compared as follows:

| *Pacific Coast* (thousand bushels) | | *Atlantic Coast* (thousand bushels) | |
|---|---|---|---|
| Seattle | 2,130 | Boston | 3 |
| Portland | 520 | New York | 4,320 |
| San Francisco | 2,210 | Philadelphia | 360 |
| Los Angeles | 140 | Baltimore | 70 |
| Total | 5,000 | Total | 4,753 |
| Drawback | none | | 1,876 |
| Net total for consumption | 5,000 | | 2,877 |

During the same period the Gulf ports imported 373,000 bushels.

*Corn and Corn Products Exported with Benefit of the Drawback Privilege.* Not all corn imports are consumed domestically. It may be re-exported as grain, or as any of the several corn products. Such exports are given the drawback privilege, which means that at the time of re-export the United States government refunds all but one per cent of the import duty paid.

The proportion of re-exports to imports is important in any attempt to determine the general effectiveness of the corn tariff. Obviously if grain were imported only to be re-exported under the drawback provision the price of domestic corn would be unaffected. Such imports and exports are a direct extension of the "milling and transportation in bond" privilege granted to domestic millers of Canadian wheat. Wheat in bond is not generally considered a direct domestic price factor. Likewise, corn imports from Argentina re-exported as glucose and corn starch[6] are not affected by the tariff duty, and consequently do not affect the domestic price.

Figures for drawbacks paid on corn are not complete, but are available for 1925 and 1928, when, following the heavy importation of corn in 1924 and 1927, about 1,550,000 and 170,000 bushels respectively were re-exported under the drawback provision. In general, such re-exports have been negligible, due chiefly to the small imports. However, when, as in 1924, there is a sharp increase in imports, there follows a correspondingly sharp increase in exports benefiting from the drawback. Since virtually all of the corn now imported into California is used as poultry feed, and not re-exported, the tariff becomes a final price determinant. It is likely, therefore, that competition from imports will be more noticeable on the Pacific than on the Atlantic coast. This is the one deficit corn region excluding Porto Rico, that imports corn for final consumption purposes.

[6] The Corn Products Refining Company imported 1,100,000 bushels of corn during 1926, 1927, and 1928. A drawback was obtained on 367,000 bushels of this three-year total while on 733,000 bushels the full duty was paid. Adapted from a letter from the Associated Corn Products Manufacturers, Chicago, Illinois.

# CHAPTER XV

## EXPORTS OF HOG PRODUCTS AND THE TARIFF

MORE domestic corn is exported as pork and lard than as grain. The equivalent of from 150 to 200 million bushels annually is so marketed abroad. The lard hog comes chiefly from the surplus corn area in and about Iowa, where farmers are fairly sensitive to any relative changes in corn and hog prices. Since half of the corn grown in the United States is fed to hogs it is obvious that the general level of corn prices is closely dependent upon hog prices. This does not mean that the price relation is necessarily a fixed mathematical ratio from month to month or even from year to year, but over a period of years the two sets of prices are inextricably joined together.[1]

### INTERNATIONAL COMMERCE IN PORK AND PORK PRODUCTS

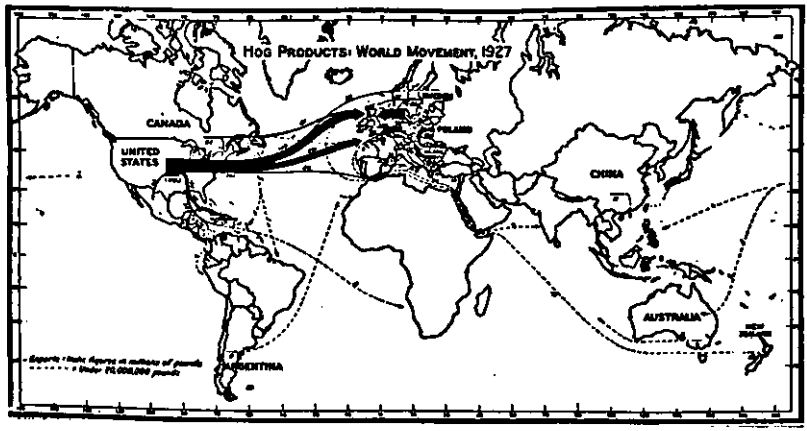


FIGURE 18. The post-war contraction of foreign outlets for American pork, and to a lesser degree for lard, is an important depressing factor on domestic hog prices. In spite of curtailed international commerce, between 80 per cent and 90 per cent of the lard entering World trade originates in the United States.

[1] In an earlier section of this monograph it was indicated that the statistical correlations of corn and hog prices have for practical reasons accepted corn prices as an independent variable. The interaction of these two prices is as yet lost in crude averages. Corn production and price data are not refined to infer changes that take place at the point where farmers may shift from corn to wheat, barley, or other farm commodities. Yet available studies indicate that over a period of years, corn prices have not varied materially relative to hog prices. This is only natural since corn derives most of its value from the demand for pork and pork products.

We should, moreover, keep in mind that the value of corn is ultimately derived from the demand for the products into which it is converted.

The argument, therefore, is clear: should the corn tariff increase corn prices it would thereby increase the cost of hog production, hence curtail supply until hog prices also increased. For instance, should the tariff boost corn prices 10 per cent, assuming no change in hog prices, the corn-hog ratio would be 10.3 bushels instead of 11.4 bushels. Corn would be dear in relation to hogs, and, judging from farmers' response in the past, there would be a sharp drop in hog production. Farmers would sell as grain a large part of the 1,400 million bushels of corn now annually fed to hogs, thus hopelessly increasing the market surplus of corn. Since corn is one of the major costs of hog production, a decline in hog prices in relation to corn prices means a decrease in hog production. The reduced supplies resulting 12 to 18 months later cause prices to rise, but production is not increased until an equilibrium point is reached between hogs and corn. Hog prices must continue to be as attractive to farmers as the next best economic opportunity.[2]

The importance of the foreign demand for pork and pork products to corn-hog prices is expressed by Knute Bjorka in a recent study:

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 of 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."[3]

[2] Haas, G. C., and Ezekiel, Mordecai, U. S. Department of Agriculture, Department. Bul. No. 1440. *Factors Affecting the Price of Hogs*, p. 21, gives a discussion of the balance between corn and hog prices. The contention is made that somewhat less than 11.4 bushels of corn would represent the necessary cost of merely maintaining constant production. The ratio of 11.4 bushels of corn to 100 pounds of hogs has been ascertained for a period of increasing production.

[3] Bjorka, Knute, *International Trade in Pork and Pork Products*, Agricultural Experiment Station, Iowa State College, 1930, Research Bulletin No. 122, p. 4.

*Foreign Demand for Pork and Lard.* Since the World War about an eighth of the total processed hog output of the United States has been exported. This includes shipments of fresh, canned, and pickled pork, cured hams and shoulders, bacon, lard, and neutral lard, with cured pork and lard leading. In spite of trade maladjustments following the World War the United States has maintained an active trade with Europe in pork and pork products, especially lard. Denmark, Poland, and the Danube basin countries have in recent years taken over a large part of the cured pork trade, but in lard the United States continues to dominate.[4]

Exports of hog products respond very noticeably to changes in domestic prices. Usually during periods of high prices exports are small, but increase rapidly as prices drop.[5] Factors influencing the foreign demand have been: (1) production in foreign countries, (2) changes in the foreign prices of oleomargarine and lard substitutes, (3) changes in wages, employment, and general purchasing power of industrial workers in Europe and (4) trade barriers. Complicating factors are tariffs, governmental policy, monetary stability, and other circumstances bearing on international trade.

Pork exports declined considerably from 1900 to 1913. During the War they trebled, increasing from 420 million pounds annually for 1910-1914 to 1,290 million pounds for the next five years. After 1920 they dropped rapidly, and during recent years have been below pre-war figures. Actual slaughter, on the other hand, has tended markedly upward, from 5,700 million pounds yearly for 1900-1904 to 8,720 million pounds in 1926-1929. As Table 40 indicates, pork exports are at present 5 instead of 12 per cent of the output as was true 30 years ago. Since 1929 exports have fallen off sharply; for example, bacon, which has perhaps fared the worst, dropped from 138 million pounds in 1929 to less than 10 million in 1932. Other pork products declined somewhat less, according to present figures.

*Lard Exports.* The relation of lard production to the number of hogs slaughtered varies from year to year in accordance with the

[4] Nourse, E. G., *American Agriculture and European Markets,* Chicago, 1924; and articles in Journal of Political Economy, Chicago, June, 1928, *The Trend of Agricultural Exports;* Bjorka, Knute, *International Trade in Pork and Pork Products,* Agricultural Experiment Station, Iowa State College, 1930; Research Bulletin No. 122; National Industrial Conference Board, *Trend in Foreign Trade of the United States,* 1930; Taylor, Alonzo E., *Corn and Hog Surpluses of the Corn Belt.*

[5] The opposite was true during 1932.

size and price of the corn crop, and the demand for lard. If corn is cheap and plentiful the farmer will fatten his hogs for market, and if the demand for lard is high the packer will produce more lard than usual in the slaughtering process. Domestic lard production rose

TABLE 40

UNITED STATES AVERAGE PRODUCTION AND EXPORTS OF PORK FOR FIVE-YEAR PERIODS, 1900-1929.

(million pounds)

| Period | Production | Exports | |
|---|---|---|---|
| | | Total | Per cent of production |
| 1900-1904 | 5,700 | 700 | 12 |
| 1905-1909 | 6,140 | 630 | 10 |
| 1910-1914 | 6,360 | 420 | 7 |
| 1915-1919 | 7,240 | 1,290 | 18 |
| 1920-1924 | 8,460 | 820 | 10 |
| 1925-1929 | 8,720 | 400 | 5 |

*Source:* 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.

from 1.5 billion pounds annually from 1900 to 1904 to 2.5 billion pounds in 1928 and 1929. Until very recently lard exports tended upward in spite of adverse post-war international economic conditions. Prior to 1913 these exports were declining and, unlike other foodstuffs, were not stimulated by the War: in 1917 they dropped to the

TABLE 41

UNITED STATES PRODUCTION AND EXPORTS OF LARD, FIVE-YEAR ANNUAL AVERAGES, 1900 to 1929

(million pounds)

| Period | Production | Exports | |
|---|---|---|---|
| | | Total | Per cent of production |
| 1900-1904 | 1550 | 570 | 37 |
| 1905-1909 | 1650 | 610 | 37 |
| 1910-1914 | 1610 | 520 | 32 |
| 1915-1919 | 1840 | 540 | 29 |
| 1920-1924 | 2410 | 880 | 37 |
| 1925-1929 | 2420 | 770 | 32 |

*Source:* U. S. Department of Agriculture, Bureau of Agricultural Economics, *Statistics of Meat Production, Consumption and Foreign Trade of the United States, 1900-1930.* Preliminary Reports. March, 1931.

low figure of 390 million pounds, but subsequently skyrocketed and reached an annual average from 1920 to 1924 of 880 million pounds, with over a billion pounds in 1923. Since 1925 exports have declined slightly, yet they averaged, including 1929, 770 million pounds yearly. Recent figures indicate further decreases, to 640 million pounds in 1930 and 570 million in 1931. Although the output of lard has steadily increased, exports have remained at about 33 per cent for a period of 30 years. Lard, the part of the hog most directly produced by corn, is definitely dependent upon foreign demand.

*Corn Equivalent of Pork and Lard Exports.* The importance of pork and lard exports to the corn producer is evinced by converting them into their corn equivalents. The yearly average export of pork and lard combined for the period 1925-1929 was 1,170 million pounds, which, on the basis of 7.5 pounds of corn to one pound of live pork, represents about 160 million bushels of corn.[6] These calculations are in all probability too low. With half of the corn output converted into hogs, of which one-eighth is exported annually, it would seem that corn exports would exceed 160 million bushels. Also, the predominance of lard in pork exports should materially raise the corn equivalent; the heavy hog, out of which packers make most of the lard, originates in the Corn Belt, mostly from the western half. The quantity of domestic corn exported annually as pork and pork products is probably about 200 million bushels.

There is unquestionably a relationship between exports of hog products and the long time level of corn prices.[7] Although European demand does not fix the price of either hogs or corn, the exports of lard and pork to Europe plus grain shipments to Canada, Cuba, and Mexico are indeed far greater and more important than the small seasonal imports of corn on the Pacific and Atlantic seaboards. Upwards of 240 million bushels of corn equivalent are thus exported annually. This exportable surplus stands on the international ledger against any long time benefit on corn. It might be maintained that the American farmer because of more efficient feeding methods and better breeding stock is able to produce pork and pork products cheaply enough to absorb the tariff protected corn and still keep his foreign lard and

[6] U. S. Department of Agriculture, *Yearbook of Agriculture, 1922,* p. 182. The Department at that time estimated that 5.6 pounds of corn were necessary to produce one pound of hog. This would be 10 pounds of hog for each bushel of corn. On the basis of dressed pork it would require approximately 7.5 pounds of corn for each pound of hog, since hogs dress between 75 and 77 pounds for each 100 pounds of live weight.

[7] See Wallace, Henry A., *Agricultural Prices,* 1920, p. 65.

pork markets. Also, it might be assumed that we have a distinct comparative advantage over foreign producers in lard production, and that since lard may be considered a by-product of the hog industry it may be sold at an actual loss, involving concealed dumping. Neither of these contentions appears to apply to the corn-hog industry. Whether we take the period during which corn was tariff-protected or on the free list, we find that the proportion of the corn crop sold for cash remained the same. Nor did the corn-hog ratio show any change; nor did exports of hog products increase when the tariff on corn was reduced or removed. This argument bears special weight since, as was emphasized above, the producers of the heavy (lard) hog in the western surplus area of the Corn Belt are quite sensitive to changes in the corn-hog ratio. Then, too, the political insistence of the Corn Belt farmers on the Equalization Fee, the Export Debenture, and similar devices to make their tariffs effective is a recognition of the uselessness of the corn tariff. Indeed, the fact is all too patent—the product into which half of the crop is converted sells at world prices.

# CHAPTER XVI

## DOMESTIC AND ARGENTINE PRICES

How much below domestic prices must Argentine corn sell before it will be imported? A comparison of Buenos Aires and Chicago prices may indicate the price spread necessary to attract Argentine corn to the United States. But the fact that there are occasional imports does not establish the effect of the corn duty on the domestic price. Nor do the price spreads necessarily throw much light upon the quantity imported.

The corn price differentials between Buenos Aires and Chicago are particularly unsatisfactory because of such factors as: (1) the sluggish adjustment of prices in Chicago and Buenos Aires due to lack of any active trading between the two markets, (2) the qualitative differences between Argentine flint and domestic dent varieties,

CORN PRICE DIFFERENTIALS BETWEEN CHICAGO AND BUENOS AIRES COMPARED TO IMPORTS

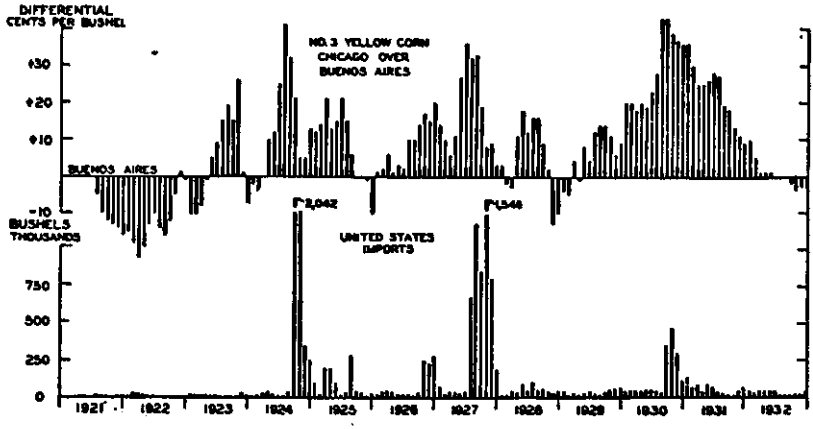


FIGURE 19. The corn price structure of the United States is only loosely connected with that of Argentina. Imports result, therefore, only after unusual price spreads between the two countries have occurred.

(3) comparative freight charges to the Atlantic and Pacific coasts from the Corn Belt and from Argentina, and the fact that the latter vary seasonally and from year to year, (4) seasonal difference in production. and (5) other factors, many of which are concealed. Quite naturally all of these influences are combined and intertwined in each monthly price differential. Elimination of these and the isolation of

the influence of the tariff are impossible. At best, the differentials are only a crude index of the spread necessary to attract Argentine corn to the Atlantic and Pacific coasts. The markets of the United States and Argentine are so loosely connected as to suggest at times a lack of any relationship at all. The fact that Argentine corn is of the flint variety, while restricting United States imports, is not objectionable to Europeans, who usually grind the corn before feeding. In the United States the two varieties of corn clearly are not freely substitutable for each other, which is important in an analysis of the differential. In the Atlantic and Pacific coast markets Argentine corn is occasionally quoted, duty-paid, at a price less than domestic No. 3 yellow. The few price data available for domestic and Argentine Corn indicate that No. 3 yellow and No. 3 mixed sell from 5 to 20 cents per bushel above the duty-paid imports.[1] This suggests that for certain uses at least Argentine corn is taken only at a considerable discount.

Furthermore, in interpreting these prices one must remember that transportation costs to the Atlantic and Pacific seaboards are lower from Argentina than from the Corn Belt. Comparative freight rates in Table 42 illustrate this fact. For example, the freight rate to Baltimore is 6 cents a bushel less from Argentina than from Chicago. Also, the cost of shipping Argentine corn to San Francisco is fully 14 cents less than from Kansas City or Wichita, Kansas.

The data here employed indicate the relation of the average monthly price spread between Buenos Aires and Chicago and corn imports for the same month. Imports need not necessarily enter the United States the same month that contracts are made. Traders may

[1] The following are a few sample quotations taken from the U. S. Department of Agriculture, Bureau of Agricultural Economics, Hay, Feed, and Grain Division. *Market News Service.*

February 11, 1928, New Argentine Corn for April and May shipments is being offered at about 20 cents below quotations on domestic corn.

August 2, 1930. Argentine corn is being offered delivered at Pacific Coast markets at about 12c per bushel below prices of domestic corn.

August 16, 1930. No. 2 yellow corn Portland quoted at $1.18¾, 1,000 tons of Argentine corn at about $1.10½ duty paid.

October 4, 1930. Argentine corn for December shipment was being offered at 93¾c per bushel at Pacific coast ports duty paid, while No. 3 mixed Domestic corn December shipment, was offered delivered at Portland at about $1.02 per bushel.

March 21, 1931. Export grades were quoted F. O. B. New York, 77⅜ and Argentine corn F. O. B. cars and elevators 67c per bushel.

March 14, 1931. Domestic corn of export grade was quoted at New York 76½, while Argentine corn was quoted F. O. B. car at elevator at 66¼c duty paid.

contract in corn futures in both markets, so that shipments may and do lag behind wide price differentials by several months.

TABLE 42

COMPARATIVE FREIGHT RATES ON SHIPMENTS OF DOMESTIC AND ARGENTINE CORN

(in cents per bushel)

| | Shipments from: | | |
|---|---|---|---|
| Shipment to | Chicago | Kansas City or Wichita | Argentina |
| Seattle | $0.404 | $0.3304 | $0.1500[a] |
| Los Angeles | .404 | .3416 | .2000[b] |
| San Francisco | .404 | .3416 | .2000[c] |
| New York | .168 | .258 | .1125 |
| Philadelphia | .1569 | | .1125 |
| Baltimore | .1736 | | .1125 |

[a] In September, 1926.
[b] About November 9, 1926.
[c] About December 10, 1926.

*Source:* Taken from the *Reports to the Advisory Board on Corn by the Tariff Commission,* dated June 23, 1927.

This correlation indicates that up to 1930 the 15-cent tariff did offset the usual prevailing price advantage of Argentine corn, although unusual supply and demand conditions during part of 1924 and 1927 increased the differentials in favor of Chicago sufficiently to permit a few imports. Under a 15-cent tariff, all other factors equal, the price spread would have permitted imports in the fall of 1923; in the summer of 1924; perhaps in March and June, 1925; in October and December, 1926; from May to September, 1927; and May, July, and August of 1928. From July, 1930, to July, 1931, the differential in favor of Chicago was wider than the 25 cent duty imposed by the Tariff Act of 1930.

The 15-cent tariff should have prevented any significant importation of corn, with the two exceptions noted. Small imports were to be expected, and did occur, in the summer of 1924 and 1927, but the quantity of corn imported was insignificant judged by any standards.

During the 1930-31 crop year an extraordinarily wide differential in favor of Chicago developed. In August and September of 1930, No. 3 yellow corn at Chicago was at one time quoted 43 cents higher than Buenos Aires. This unusual spread was due primarily to the oper-

ations of the Federal Farm Board. Prices of all grains in the United States were indirectly maintained, presumably above world parity, by the wheat operations of the Farm Board; and the partial corn crop failure of 1930 was a contributory factor. However, although Chicago prices averaged 33 cents per bushel above Buenos Aires during 1930-31, imports did not total two million bushels. The 1930 corn crop was the smallest since 1901; yet imports were only a fraction of one per cent of domestic consumption. Although the 25-cent tariff helped to counteract the abnormal spread, corn exports from the United States, in the face of this adverse price relation, far exceeded imports. In other words, although the activities of the Federal Farm Board and the corn crop failure of 1930 kept American corn prices from dropping with world grain prices, creating an unusually large differential in favor of Chicago, nevertheless, total exports of corn from the United States were greater than imports.

TABLE 43

AVERAGE ANNUAL MARGIN OF CHICAGO NO. 3 YELLOW CORN OVER ARGENTINE CORN AS QUOTED AT BUENOS AIRES, 1921-22 to 1930-31

(in cents per bushel)

| Year beginning July 1 | Chicago over Buenos Aires |
|---|---|
| 1921-22 | —14.0 |
| 1922-23 | — 1.6 |
| 1923-24 | 9.0 |
| 1924-25 | 17.7 |
| 1925-26 | 2.0 |
| 1926-27 | 15.8 |
| 1927-28 | 12.0 |
| 1928-29 | 2.1 |
| 1929-30 | 15.5 |
| 1930-31 | 33.0 |

*Source:* Adapted and compiled from price quotations as given by the U. S. Department of Agriculture in the *Yearbook of Agriculture, 1932.*

Although annual price averages tend to obscure significant irregular variations, they may be useful in connection with the interpretation of monthly data as plotted in the several accompanying figures. The averages herein employed are for the crop year beginning July 1. In 1921-22 and 1922-23 Argentine prices averaged 14 cents and 1.6 cents respectively over Chicago. Since 1922-23 Chicago prices have for each year averaged above Buenos Aires quotations. The years when the margins were narrowest are 1925-26 and 1928-29,

with a 2-cent spread. In 1924-25 the average margin climbed to 17.7 cents a bushel, and some corn was imported. The spread averaged 15.9 cents a bushel for 1926-27, 12 cents for 1927-28, and 15.5 for 1929-30. The operations of the Federal Farm Board, together with the small crop of 1930, were responsible for the extraordinary differential of 33 cents in that year.

## CHAPTER XVII

## SUMMARY OF THE PRESENT AND PROBABLE FUTURE BENEFITS FROM THE TARIFF ON CORN

IT thus appears that the tariff on corn is not an important price factor. It does not raise the general level of corn prices in the United States. Corn Belt farmers received no measurable benefits from the 15-cent per bushel duty in force prior to 1930, nor is it likely that they will profit from the present 25-cent rate. Moreover, should a prohibitive duty be enacted it would probably affect not at all the prices paid in any of the primary domestic markets. It is possible, though not probable, that drastic crop failures might make imports a general price factor. The short crops of 1924 and 1930, however, did not make Argentine supplies a factor in American prices. It is true that the market in any one day or week might be depressed or buoyed up by Argentine news, but such effects are ephemeral. In general the month-to-month American corn prices are determined by domestic forces, important among which is the present and prospective value of hogs.

Corn, king of all grains both in acreage and value, is not a cash crop—85 per cent of it is used on farms, and less than 10 per cent is sold in the primary markets. It is fed in the large central area of the United States where it is grown.

The tariff does not raise domestic prices for two reasons: (1) World corn prices are not nearly so integrated or well organized as world wheat, cotton, or butter markets; the adjustment is noticeably sluggish. American prices are plainly independent of foreign prices, both because the United States produces 60 per cent of the world crop, and because so small a portion is marketed. The value of corn is derived from outlets other than cash sales.

(2) Direct products of corn are definitely on an export basis. Of all domestic corn production, 50 per cent is fed to hogs. We export annually over a billion pounds of pork and lard, the equivalent of more than 200 million bushels of corn. Hog and corn prices are interrelated. If a tariff raises the general level of corn prices, then prices of live hogs should also rise. But pork and especially lard prices depend upon European demand.

Since 1922 exports of corn and corn meal have averaged about 30 million bushels annually; 10 million bushels more have gone out in the form of corn oil, corn starch, glucose, and grape sugar; approximately 200 million bushels have been exported as pork and lard. The United States yearly exports the equivalent of more than 240 million bushels of corn; imports are less than two million bushels and one-fifth of this has been again exported with the benefit of the drawback provision. If the present imports of blackstrap molasses are considered the equivalent of corn the total reaches 75 million bushels.

Corn is not in a position to benefit from a tariff on blackstrap molasses. Although before the War considerable corn was used in the manufacture of industrial alcohol, since that time molasses has so far replaced it as a cheap raw material that even a tariff many times as high as the present would in all probability not force manufacturers to employ corn. The location of the industrial alcohol plants, the cheapness of blackstrap molasses, and its lower relative conversion costs are reasons for continuing its use in preference to corn.

The recent increase of the tariff on corn from 15 cents to 25 cents per bushel will tend to increase the competitive advantage of domestic corn over Argentine corn on the Pacific and Atlantic coasts by more fully equalizing freight differences between the Corn Belt and Argentina. The small imports on the west coast for poultry feed and on the east coast for manufacturing purposes, however, does not normally affect the market in any measurable degree. Imports, minus re-exports under the drawback, are .07 per cent of our usual crop. Their price influence is too small to be measured by present statistical technique. Nor is it reasonable to suppose that they are of any significance in determining the ultimate value of this our largest and most valuable farm crop.

TABLE 44

UNITED STATES EXPORTS OF CORN AND CORN PRODUCTS INCLUDING PORK AND LARD, 1909-10 TO 1931-32

(million pounds)

| Year Beginning July 1 | Pork | Lard | Corn Starch | Glucose & Grape Sugar | Corn Oil | Corn & Corn Meal (million bushels) |
|---|---|---|---|---|---|---|
| 1909-10 | 344 | 363 | | 150 | | 38 |
| 1910-11 | 403 | 476 | | 182 | | 66 |
| 1911-12 | 540 | 532 | | 171 | | 42 |
| 1912-13 | 466 | 519 | | 200 | 19.8 | 51 |
| 1913-14 | 441 | 481 | | 199 | 18.3 | 11 |
| 1914-15 | 630 | 476 | | 158 | 17.8 | 51 |
| 1915-16 | 1036 | 427 | | 186 | 9.0 | 40 |
| 1916-17 | 1057 | 445 | | 215 | 8.8 | 67 |
| 1917-18 | 1299 | 393 | 39 | 98 | 1.8 | 49 |
| 1918-19 | 1980 | 725 | 107 | 136 | 1.1 | 23 |
| 1919-20 | 1176 | 587 | 163 | 245 | 12.5 | 17 |
| 1920-21 | 776 | 746 | 110 | 142 | 7.0 | 71 |
| 1921-22 | 704 | 812 | 349 | 274 | 5.3 | 179 |
| 1922-23 | 842 | 953 | 254 | 163 | 5.2 | 96 |
| 1923-24 | 919 | 1015 | 255 | 148 | 4.2 | 23 |
| 1924-25 | 607 | 793 | 210 | 140 | 3.6 | 10 |
| 1925-26 | 478 | 695 | 208 | 170 | 2.9 | 26 |
| 1926-27 | 337 | 676 | 212 | 149 | .4 | 20 |
| 1927-28 | 330 | 716 | 276 | 146 | .3 | 19 |
| 1928-29 | 331 | 781 | 232 | 123 | .3 | 42 |
| 1929-30 | 351 | 787 | 201 | 102 | | 10 |
| 1930-31 | 205 | 586 | 103 | 70 | .9 | 3 |
| 1931-32 | 130 | 550 | 72 | 52 | .8 | 4 |

*Source:* From U. S. Department of Agriculture. *Yearbook of Agriculture,* 1932, and *Crops and Markets,* October, 1933.

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