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Federal Agricultural
Statistics

By Joseph S. Davis.

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SOME OBSERVATIONS ON FEDERAL AGRICULTURAL STATISTICS

By JOSEPH S. DAVIS

I have been drafted to present some observations on the agricultural statistics published by the Federal Government, from the viewpoint of a "consumer" of those statistics. I do not pose as an authority on the subject; I have unfortunately been unable to be in Washington during the preparation of my paper; the field is so vast that I cannot pretend to exhaust it; but I will not waste valuable minutes in praying forgiveness for sins of omission and commission or in defending my somewhat random selection of high spots. I count upon the discussion to supplement as well as to correct my statement.

AN APPRECIATION

First I must express, with emphasis and without flattery, cordial appreciation of the valuable work of both the Census Bureau and the Department of Agriculture—notably the Bureau of Agricultural Economics—in the field of agricultural statistics. For furnishing primary data of increasing scope in summarized form and in considerable detail, for analyses and estimates, for contributions to statistical method, and in many other ways the "consumers" of agricultural statistics, and indeed statistical workers in general, owe a great and increasing debt to the Federal Government. No other country today, I believe, is so well served, and the results are increasingly evident in a surer grappling with agricultural problems by the individual farmer and research worker, if not yet so obviously in respect to legislation.

The taking of an inter-decennial census of agriculture; the monthly reports on cotton ginned and flour milled; quarterly reports on stocks of wheat and other cereals, hides and skins, and fats and oils; the biennial censuses of manufactures covering the use of agricultural products as materials; the new series of census monographs: All these represent significant additional contributions from the Census Bureau of great value to users of agricultural data. The *Agriculture Yearbooks*, *Crops and Markets*, *Foreign Crops and Markets*, and special bulletins and mimeographed materials of the Department of Agriculture are full of excellent data of broader scope and better quality than were formerly available. Special mention should be made of improvements in methods of crop and livestock estimation; compilations of weekly visible supplies of cereals; various indexes of farm prices, farm wages, farm

real estate values, etc.; estimates of agricultural income; analyses of the world situation in various commodities; outlook reports; price analysis studies; experiments with multiple correlation, etc. In increasing measure much of this material is proving of direct value to farmers and business men, apart from its bearing on economic and political problems.

I am also impressed by the comparative absence, in these bureaus, of a spirit of complacent self-satisfaction. A proverbial tendency in governmental statistical work—to say, “We have always done thus and so; let well enough alone”—is certainly not characteristic of these organizations today. There is a commendable readiness to admit limitations, deficiencies, and even errors in *statistical data*, methods, and interpretation, and to welcome—so far as anyone can be said to welcome—criticisms and suggestions. This is as it should be, but it is none the less a matter for congratulation. Especially in the Bureau of Agricultural Economics there has been developed in recent years a group of research workers who command high respect as such, and who display a competence and a progressive, scientific spirit which reflect great credit on the Department leaders as well as on themselves. Their researches have done and are doing much toward bringing current agricultural statistics up to the standards required by all research workers.

Of these things I will say no more; but whatever I say in criticism of the federal agricultural statistics should be understood against this background of respect and admiration. Withal, however, we are gratified but not satisfied, and I venture to think that our craving represents something more rational than the cry of a pampered child for the moon.

SOME SHORTCOMINGS IN BASIC DATA

(1) *Crop Acreage and Production.* Among the most basic census data are those on crop acreage and production. Here, if anywhere, the consumer of statistics must rely heavily upon the census. I regret to say that careful investigation shakes one's confidence in these census figures as available over a period of 60 years. It is too much to expect even a census enumeration to be complete, though we are prone to assume that it is. But there is evidence of material variation in incompleteness from state to state and from census to census. This gives real cause for concern.

Some years ago, in plotting annual data on wheat acreage, as revised by the Department of Agriculture on the basis of census figures, I was struck by the fact that changes in trends occurred conspicuously at the census years—which I could hardly accept as inherently probable.

Later, Holbrook Working found that census data on wheat acreage by states showed inconceivable shifts in levels, implying overstatements or understatements in particular censuses.¹ The Department's published revision of annual estimates of crop acreage in New York State²—intended as a model for similar revisions of similar data for all the states—strongly suggests errors in census data for which no correction was attempted. The production data, which in many cases can be checked by data on disposition, derived in some cases from more adequate censuses of manufactures, are much more defective than the acreage statistics. If such figures are as defective as we suspect, the raw material for historical studies of many kinds, including newer types like price analyses and indexes of physical production, cannot safely be used for such purposes, and many such studies already made are weak in their very foundations.

Some of the worst difficulties arise in the 1890's, but latest figures do not command confidence. The published data of the agricultural census of 1925 leave one greatly troubled on this point. Consider Table I, comparing census figures for acreage and production of certain

TABLE I
ACREAGE AND PRODUCTION OF CERTAIN CROPS IN 1924, ACCORDING TO CENSUS REPORTS AND REVISED ESTIMATES OF THE DEPARTMENT OF AGRICULTURE *

Crop	Area Harvested (thousand acres)			Production (thousand bushels)		
	Census	U. S. D. A.	Difference (per cent)	Census	U. S. D. A.	Difference (per cent)
Winter wheat.....	34,360	35,656	+ 3.8	553,377	592,259	+ 7.0
Spring wheat.....	16,503	16,879	+ 2.3	247,499	272,169	+10.0
Total wheat.....	50,862	52,535	+ 3.3	800,877	864,428	+ 7.9
Rye.....	3,744	4,150	+10.8	55,674	65,466	+17.6
Barley.....	6,767	6,925	+ 2.3	159,139	181,575	+14.1
Oats.....	40,819	42,110	+ 3.2	1,304,599	1,502,529	+15.2
Flaxseed.....	3,435	3,469	+ 1.0	28,246	31,547	+11.7
Rice.....	744	850	+14.2	29,526	32,498	+10.1
Peanuts.....	1,105	1,187	+ 7.4	26,899	745,059 ^a	+25.9
Hay.....	74,096	76,352	+ 3.0	88,384 ^b	112,481 ^b	+27.3
Cotton.....	39,204	41,360	+ 5.5	13,683 ^c	13,628 ^c	- 0.4
Tobacco.....	1,538	1,706	+10.9	1,106,340 ^a	1,251,343 ^a	+13.1
Potatoes.....	2,911	3,327	+14.3	352,462	421,585	+19.6
Sweet potatoes.....	467	688	+47.3	37,444	53,912	+44.0

* Data from *Census of Agriculture, 1925*, and *Crops and Markets, Monthly Supplement*, December 1926.

^a Thousand pounds. ^b Thousand tons. ^c Thousand bales.

crops with revised estimates subsequently published by the Department of Agriculture. The Department's figures for acreage are 2 to 4 per cent higher than the census figures, for most crops, and much higher for several of the lesser crops (*e. g.*, rye, rice, potatoes, sweet potatoes,

¹ See the study cited later, p. 8.

² *Department Circular No. 373*, April, 1926.

tobacco). The production figures of the Department of Agriculture are much further above those of the census—in wheat 8 per cent, in most other crops considerably more. In each of these cases the Department's revised figures were published after the census data became available, and the difference represents a carefully considered judgment of the understatement in the census data, reached after close study of supplementary information. The Department's figures may not be correct; but there is reason to believe that the difference, in acreage at least, represents a conservative measure of the understatement in the census figures, rather than an overstatement by the Department of Agriculture; and in the case of certain crops the available checks on production estimates, readily available to outside investigators, appear to justify the higher figures of the Department.

These observations lead to two suggestions. In the first place, it is important that measures be taken to increase the accuracy and degree of completeness in future census data on agriculture. This is partly a matter of expense, to which I shall shortly refer. It is partly a matter of organization. The proposal that the task of administering the agricultural census be transferred to the Department of Agriculture would seem to deserve consideration. In any event, census taking in agriculture can presumably be made much more efficient by extensive use of the far-flung organization of the Department of Agriculture and associated state officials.

In the second place, it is quite desirable that historico-statistical studies be made, in the Census Bureau or Department of Agriculture or outside, that will lead to carefully checked and reasonably reliable revisions, state by state, for a considerable series of past years, in the statistics of acreage and production of various crops, which could henceforth be used for many purposes rather than the data as reported by the successive censuses. Outside investigators can contribute something toward such revisions, especially in the way of experiments in technique and provisional approximations;¹ but the task is a formidable one, and for its successful completion the resources of the Census Bureau and the Department of Agriculture must be utilized in ways that are not open to unofficial investigators. In addition to their direct value, such studies would incidentally contribute toward improvements in subsequent census data.

(2) *Livestock and Animal Products.* Among the weakest elements in our agricultural statistics are the data on animal population, and the production of meat, lard, milk, butter, and other animal products. In

¹ An example is Holbrook Working's revision of official estimates, for the whole country, of wheat acreage and production since 1866, in *Wheat Studies of the Food Research Institute*, June 1926, II: pp. 237-64.

the aggregate the output of the animal industries represents, as you know, a large and increasing portion of the total value of agricultural products.

The census gives figures for animal population. Unfortunately there have been two changes of date, and another is under consideration: For the years 1850 to 1900 the figures are as of June 1; for 1910 as of April 15; for 1920 and 1925 as of January 1. So great may be the changes in the animal population in these intervals—from births, slaughter, and deaths from natural causes, and also in location—that the figures for different dates are not properly comparable. This is particularly the case with calves, sheep and lambs, and swine. Moreover, these census data, like those on crop acreage and production, are believed to be incomplete in varying degrees in different states and at different censuses. Furthermore, such are the shifts from one year to another in several classes of animals that accurate decennial or even quinquennial figures may give erroneous indications of trends. Annual data are essential.

For recent years a division of the Bureau of Agricultural Economics has developed improved methods for preparing annual estimates as of January 1, more or less independent of the census figures. Its latest revised figures, as shown in Table II for certain groups of animals for

TABLE II
LIVESTOCK COUNT JANUARY 1, 1920 AND 1925, ACCORDING TO
CENSUS REPORTS AND REVISED ESTIMATES OF THE
DEPARTMENT OF AGRICULTURE *

(Thousands)

Class	January 1, 1920			January 1, 1925			Change, 1920-25	
	Census	U. S. D. A.	Difference (per cent)	Census	U. S. D. A.	Difference (per cent)	Census	U. S. D. A.
Horses	19,767	19,848	+ 0.4	16,401	16,489	+0.5	-3,366	-3,359
Mules	5,432	5,475	+ 0.8	5,681	5,725	+0.8	+ 249	+ 250
Cattle and calves . .	66,640	68,871	+ 3.3	60,760	61,996	+2.0	-5,880	-6,875
Sheep and lambs . .	35,034	40,243	+14.9	35,590	38,112	+7.1	+ 556	-2,121
Swine	59,346	59,813	+ 0.8	50,854	55,568	+9.3	-8,492	-4,245

* Data from *Census of Agriculture, 1925, Crops and Markets, and Agriculture Yearbooks.*

January 1, 1920 and 1925, are in all cases above the census figures for the census dates, and in some instances the differences are radical. In the case of sheep and lambs the census figures show an *increase* of sheep and lambs of 556,000, or 1½ per cent, while the Department's figures show a *decrease* of 2,131,000, or over 5 per cent. For hogs, the census data show a decline of 8,492,000, or about 14 per cent, while the

Department's figures show a decline of only 4,245,000, or 7 per cent. The Department's estimates may perhaps be wide of the mark, but when revised with the aid of detailed census data and other resources available to the Department, they are presumably more nearly correct than the census data. The differences noted suggest great danger in relying heavily upon the census data on livestock, and on the Department's interpolations of annual data for the years before the Department had developed its system of estimates to the present stage.

It is clearly advisable to develop further the good work of the Division of Crop and Livestock Estimates, and in particular to devote more effort to research in methods of estimating. It seems possible that the census enumerations in this field will in future have their principal value in affording checks upon the Division's estimates and in giving a degree of regional detail which the estimates cannot furnish except at prohibitive cost. But for this purpose also it is highly desirable that the collection of the census data be made with the utmost advantage of the Department's knowledge, experience, and organization.

On annual production of meat and other livestock products the information is much less satisfactory than for livestock count. Here the census data must be regarded as much less adequate and accurate than for crop acreage, and probably less satisfactory than for crops produced. The Bureau of Animal Industry prepares annual estimates of meat and lard production, and its series now runs back to 1907. These estimates rest in part on census data for census years and the Department's annual estimates of livestock population, with allowances for losses and estimates of the calf crop—both exceedingly difficult to make—but mainly upon statistics of federally inspected slaughter. For other wholesale slaughter (except as covered by the biennial censuses of manufactures), retail slaughter, and farm slaughter, which in the aggregate are very important, there are no data except the inadequate and not highly reliable figures given by the censuses of 1910 and 1920. In default of information, the Bureau has felt it necessary to proceed on the very dubious assumption (with certain modifications) that the proportion of federally inspected slaughter has remained about as it was reported for 1909, and that the total slaughter bears the same ratio to livestock population that was indicated by the inadequate data for 1909. Further difficulties arise in that the amount of meat (and lard) produced per head of animals slaughtered is not known, except through annual figures of federally inspected slaughter and biennial censuses covering wholesale slaughter. The practice of applying these ratios to estimated total slaughter is admittedly defective. Under these circumstances one can say—without in any way reflecting upon the

intelligence with which the estimates are made—that our statistics of animal slaughter and meat production and consumption may be, and probably are, quite wide of the truth. For dairy and poultry products the case is no better, and in some respects perhaps even worse.

Here is a serious gap in statistics of large importance for the trades concerned, for students of agriculture and food consumption, and for price analyses. The essential thing is to obtain more adequate basic data upon which to base the necessary estimates, and thus to reduce the area within which estimates must be resorted to. Among other things, new census data on retail slaughter and farm slaughter, more information on weight of animals slaughtered and ratios of dressed weight to live weight, are urgently needed. The problem of preparing reliable estimates should be frankly faced, and steps outlined for securing the basic materials essential to reaching this result.

ESTIMATES AND ANALYSES

Some of the notable advances in recent years, especially in the Bureau of Agricultural Economics, have been made in the construction of estimates and analyses designed to throw light on situations which cannot adequately be revealed by mere collections of data. Apart from the direct value of its results, this work reacts favorably upon the collection of basic data. Defects and deficiencies are revealed; valueless and misleading data are shown up as at least dispensable; and means of improving the data and their collection are suggested. For these reasons as well as for its own sake, more of this sort of work is needed. We can well do with a reduced rate of increase in the volume of data if the selection and quality are continuously improved.

Much of this work can best be done in government offices with the aid of unpublished materials and of other material available in advance of publication. But much of it can be done by outside investigators. For their use it is highly desirable that comments, qualifications, and reservations should be made in connection with published tabulations. This is done to a limited extent, but not as fully as one could wish.

Furthermore, in the case of all important current estimates and calculations, it is greatly to be desired that, in a measure not the rule at present, adequate statements of procedure and working data be made available (at least in mimeographed form) to scientific investigators outside the Department. Supplementary and revised statements should be made when changes in methods are adopted, and substantial revisions in estimates should be explained. This policy would enable these investigators not only to interpret the results more intelligently, with due reservations or modifications, but also to contribute

toward improving the calculations themselves. How far such statements exist in manuscript form within the Department I do not know; certainly they are important there in view of its changing staff, and would be invaluable for future historical studies extending over a long period.

A QUESTION OF BIAS

With some hesitancy I feel bound to touch upon one delicate matter. Can one accept as entirely without bias the statistical data of the Department of Agriculture, in particular where estimates and interpretations are involved? Can one assume that competent scientific investigators outside the Department, with the same resources, would reach substantially the same results as those published?

For the most part I believe the answer is a confident affirmative. I see no evidence that published forecasts or estimates of crops, or forecasts of prices, have been influenced by other considerations than the evidence itself. But there is a danger here, arising not from within the Department but from outside. Some months since, a break in the cotton market was charged up to a Department statement regarding price prospects. The criticism was loudest from spokesmen for the growers, who seem to have felt that the Department was responsible for lowering prices and so acting contrary to the growers' interests. There appears to be a fairly widespread feeling that it is somehow quite objectionable, indeed almost unpatriotic, to predict lower prices, poorer business, or anything that may lead to either, as if the prediction tended to cause the evil to happen. Apparently what such critics would like is a kind of discrimination in forecasts and their statement. The Department must vigorously guard against the temptation to respond to any such pressure. Forecasts of crops, of prices and price tendencies, are at best imperfect, and should certainly be couched in guarded terms. But it will be most unfortunate if condemnations of unpalatable truths, or even of actual errors, should force the Department to slacken its excellent progress in the difficult art of forecasting or cause it to modify the publication or expression of forecasts in the apparent interest of the farmers.

The Department's record in the respects just mentioned is, I think, a good one. I am not quite so comfortable, however, about some data and estimates bearing on the agricultural depression and the current position of the farmers. After all, the Department of Agriculture is rightly expected to have the interests of the American farmer primarily at heart. Decisions as to what work shall be done, and what results shall be published, rest ultimately with a political appointee who must seek to stand well with the farmers. In a period like that of recent

years, when the position of the farmer has been the subject of political agitation, the sensitiveness to reactions of farmers and their spokesmen is keener than usual. Workers in the Department almost necessarily develop, if they did not have it on entering, a strong sympathy with the farming class. Have these conditions resulted in a bias? Let me cite two or three cases.

The Department has for some years published annual summaries of questionnaire surveys of costs of producing leading crops in the major geographical regions. For the first two or three years, there was set against the average cost per bushel the average value per bushel sold by the farmers reporting. As published these figures showed, in most cases until 1924-25, average costs exceeding average returns. In the more recent summaries, however, the figures for average returns have been omitted—partly, I understand, on the ground that the comparison was open to misinterpretation. Now I infer that, had the later figures been obtained and published, they would have shown, in most cases, an excess of returns over average costs. The danger of misinterpretation was apparently effectively realized only when the interpretation was comparatively favorable to the farmer.

Again, some comparisons of average income per farm family and per factory employee in connection with the intricate and valuable estimates of gross income, expenditures, and net income of farmers, are open to question at certain points—among others, in the selection of 1919 as the base year, in counting taxes wholly as costs rather than in part as disposition of income, and in disregarding outside labor income of farmers and unemployment among factory workers. The net effect has been, I believe, to exaggerate the effects of the agricultural depression and the inferiority of the real income of the farm family. Certainly the published results have lent themselves to misuse and misinterpretation in many hands, and not entirely without reason. The same is true, I believe, of the tendency to use the Department's index of the purchasing power of farm products as a major indicator of the farmers' position.

I may be quite wrong, and certainly I would not lay great stress on the point. It is natural and desirable that pains should be taken, in the selection, analysis, and presentation of evidence on the economic and financial position of the farmer, to avoid showing the position in too favorable a light; but I am not sure that equal pains have invariably been taken to avoid showing it in too unfavorable a light. How far this tendency, if it exists, may be due to the statistical workers themselves, and how far to those higher up, I am not in a position to say. In either case I believe that whatever bias may exist is largely uncon-

scious. But both producers and consumers of these statistics need, I believe, to be on their guard against such a tendency. It is one that is not unlikely to crop up in other connections than those I have mentioned in which political considerations may influence the approval or disapproval of material for publication and thus make for a bias in selection even though the bias is not present in the material that is published.

FINANCIAL NEEDS OF THE CENSUS

A final word with regard to the census: I cannot escape the conviction that the Census Bureau suffers from chronic financial malnutrition. It has not enough funds to do well the work demanded of it. It is generally believed that the inadequacies in enumeration in the 1925 census of agriculture were due in no small measure to the low rate of pay for enumerators. The higher level of wages and salaries inevitably involves a higher cost for such work except at the expense of its quality. A stingy policy can only result in a degree of slackness that detracts from the value of the results in a measure quite out of proportion to the quantitative errors or omissions. I believe also, though I have not tried to prove it, that the Census Bureau, even more than many other governmental bureaus, suffers from low salary standards especially in the higher positions. Much of its work is indeed of routine character, but the direction of its work, the formulation of schedules and tabulations, the analysis of its raw data, and maintenance of high standards of collection, checking, and editing, are tasks so exacting as to require highly trained and experienced persons, and a larger measure of methodological research. Some of the needed talent is obtained from special experts or consultants, but the Bureau seems to offer too little attraction to get and hold such persons in sufficient numbers on its own staff. Paradoxically, an economy policy may be very costly.

Another example lies in the destruction of the original census schedules, which are of great value for studying trends of agriculture in various local regions. For lack of storage space these schedules have been destroyed for the 1910 and earlier censuses, and the destruction of the 1920 schedules is imminent. It is a problem worthy of serious consideration by these associations whether the potential usefulness of these raw materials may not justify a policy of storage rather than a policy of destruction.

There is some reason to believe that the Director of the Census and the Secretary of Commerce feel in a weak position to urge really adequate appropriations for the Census Bureau. If so, it is incumbent upon professional associations like those here assembled, whose members draw so heavily upon census data for raw material for significant

research products, and who realize most keenly the importance of quality in the raw material, to bring persuasively to the attention of Congress the importance of appropriating funds ample to secure results of a consistently high standard of quality. The Joint Advisory Committee on the Census does valuable work, but it regards its function as mainly a technical one of advising with the Census Bureau. From this Committee or some other we need such reports to our associations as will enable us to exert effective influence not upon the Bureau itself but upon the public in general and Congress in particular to the end that the work shall be adequately sustained.