Volume Title: Income in the Various States: Its Sources and Distribution, 1919, 1920, and 1921

Volume Author/Editor: Maurice Leven

Volume Publisher: NBER

Volume ISBN: 0-87014-006-X

Volume URL: http://www.nber.org/books/leve25-1

Publication Date: 1925

Chapter Title: Agricultural Expenses

Chapter Author: Maurice Leven

Chapter URL: http://www.nber.org/chapters/c4997

Chapter pages in book: (p. 166 - 184)

CHAPTER VIII

AGRICULTURAL EXPENSES

In the foregoing chapter, we have surveyed the significant items of agricultural income. We shall now attempt to review briefly the items of expense that must be deducted from the total gross farm income in order to arrive at estimates of the amounts received in each State by the owners and operators of farms. As will be seen, some of the items of expense are payments to other industries for materials and supplies, or the use of capital necessary in the conduct of agriculture. Other items of expense are merely deductions to offset duplications in the figures of the gross income.

Expenses for Farm Implements.

The estimated cost of farm machinery used by farmers of the United States has been apportioned to the several States in accordance with the total value of implements on hand on January 1, 1920, and the acreage under cultivation each year. In computing the cost of farm implements in each State in 1919, the values as reported in the 1920 Census were used as a basis. For 1920 and 1921 the Census figures were adjusted by means of the ratios of crop acreage in each given year to that of 1919. The estimated cost of implements in thousands of dollars together with the per cents of the total in each State during 1919, 1920, and 1921, are recorded in Table XXII. It will be seen that, as might be expected, the Middle West possesses about 54 per cent of the farm implements of the country, and consequently bears over 50 per cent of the annual expenses for this item.

Farm Expenses for Fertilizer.

The amounts spent on fertilizer by farmers of each State in 1919 are recorded in the 1920 Census of Agriculture. The expenses for this item in 1920 and 1921 were estimated by distributing the estimated total cost of fertilizer for the Continental United States in

TABLE XXII.—FARM EXPENSES FOR FARM IMPLEMENTS IN EACH STATE, 1919–1920–1921

State and Geographic Division	Thousands of Dollars			Per Cent of Total		
	1919	1920	1921	1919	1920	1921
Continental United States	**455,970**	**526,710**	**254,760**	**100.000**	**100.000**	**100.000**
New England	**11,719**	**13,536**	**6,548**	**2.570**	**2.650**	**2.666**
Maine	3,379	3,903	1,888	.741	....	....
New Hampshire	1,204	1,390	673	.264	....	....
Vermont	2,695	3,113	1,506	.591	....	....
Massachusetts	2,453	2,834	1,371	.538	....	....
Rhode Island	305	353	170	.067	....	
Connecticut	1,683	1,943	940	.369	....	....
Middle Atlantic	**45,556**	**52,625**	**25,453**	**9.991**	**10.163**	**10.332**
New York	21,549	24,894	12,040	4.726	....	....
New Jersey	3,228	3,729	1,804	.708	....	....
Pennsylvania	20,779	24,002	11,609	4.557	....	....
East North Central	**99,716**	**115,186**	**55,713**	**21.869**	**21.718**	**21.794**
Ohio	18,594	21,479	10,389	4.078	....	....
Indiana	16,164	18,672	9,031	3.545	....	....
Illinois	28,243	32,625	15,780	6.184	....	....
Michigan	15,521	17,929	8,672	3.404	....	....
Wisconsin	21,194	24,481	11,841	4.648	....	....
West North Central	**147,515**	**170,401**	**82,420**	**32.352**	**31.909**	**32.118**
Minnesota	22,972	26,536	12,835	5.038	....	....
Iowa	39,218	45,302	21,912	8.601	....	....
Missouri	17,537	20,257	9,798	3.846	....	....
North Dakota	14,481	16,728	8,091	3.176	....	....
South Dakota	14,258	16,410	7,966	3.127	....	....
Nebraska	19,424	22,438	10,853	4.260	....	....
Kansas	19,625	22,670	10,965	4.304	....	....
South Atlantic	**36,013**	**41,600**	**20,121**	**7.898**	**7.989**	**7.846**
Delaware	857	990	479	.188	....	....
Maryland	3,675	4,245	2,053	.806	....	....
District of Columbia	123	143	69	.027	....	....
Virginia	6,365	7,353	3,557	1.396	....	....
West Virginia	2,334	2,697	1,304	.512	....	....
North Carolina	6,932	8,006	3,872	1.520	....	....
South Carolina	6,097	7,042	3,406	1.337	....	....
Georgia	8,039	9,286	4,492	1.763	....	....
Florida	1,591	1,838	889	.349	....	....
East South Central	**22,333**	**25,798**	**12,478**	**4.898**	**4.864**	**4.835**
Kentucky	6,133	7,084	3,427	1.345	....	....
Tennessee	6,780	7,832	3,788	1.487	....	....
Alabama	4,359	5,035	2,435	.956	....	....
Mississippi	5,061	5,847	2,828	1.110	....	....
West South Central	**39,460**	**45,581**	**22,047**	**8.654**	**8.850**	**8.985**
Arkansas	5,504	6,357	3,076	1.207	....	....
Louisiana	4,154	4,798	2,321	.911	....	....
Oklahoma	10,227	11,814	5,714	2.243	....	....
Texas	19,575	22,612	10,936	4.293	....	....
Mountain	**24,189**	**27,942**	**13,515**	**5.305**	**5.444**	**5.299**
Montana	6,976	8,059	3,898	1.530	....	....
Idaho	4,874	5,631	2,724	1.069	....	....
Wyoming	1,491	1,722	833	.327	....	....
Colorado	6,320	7,300	3,531	1.386	....	....
New Mexico	1,236	1,427	690	.271	....	....
Arizona	1,117	1,291	624	.245	....	....
Utah	1,714	1,980	958	.376	....	....
Nevada	461	532	257	.101	....	.....
Pacific	**29,469**	**34,041**	**16,465**	**6.463**	**6.413**	**6.125**
Washington	6,940	8,016	3,877	1.522	....	....
Oregon	5,271	6,089	2,945	1.156	....	....
California	17,258	19,936	9,643	3.785	....	....

accordance with an index based on the quantities consumed yearly in each State, and the reported costs in 1919.

The index may be expressed algebraicly as $\frac{A \times C}{B}$, A being the quantity used in the given year, B the quantity used in 1919, and C the value of fertilizer used in 1919. A and B were obtained from the *American Fertilizer Hand Book*, and C from the 1920 *Census of Agriculture*.

Table XXIII gives comparative figures for 1919, 1920, and 1921 of the farm expenses for fertilizer. The States bordering the Atlantic seacoast apparently use about 75 per cent of the total commercial fertilizer in the United States, the two Carolinas and Georgia alone consuming about 45 per cent.

Farm Expenses Incurred in the Business Use of Automobiles.

The automobile is more and more becoming a part of agricultural equipment. It is, however, difficult, if not impossible, to estimate just how much farmers spend for automobiles for business use. In the majority of cases, the same machine is used for both personal and business purposes, and there is no way of determining mathematically the proportion of the expense to be charged against each class of service. On the basis of 30 per cent for business and 70 per cent for personal use, W. I. King estimates the business costs of automobiles on the farm as $297,969,000 in 1919, $430,936,000 in 1920, and $329,836,000 in 1921. These totals may be accepted as conservative, and they are probably not very far from the truth. The estimated expenses for business use of automobiles in each State have been obtained by apportioning the above totals in accordance with the value of automobiles on the farm on January 1, 1920, which is reported by States in the 1920 *Census of Agriculture*. The final figures for this item of expense appear in Tables XXXI, XXXII, and XXXIII.

The Value of Farm Buildings and the Number of Automobiles on the Farm.

A very interesting relationship obtains when we compare the number of automobiles on the farm in the different sections of the country with the value of farm buildings. Table XXIV gives

TABLE XXIII. — COST OF FERTILIZER USED ON FARMS IN EACH STATE, 1919–1920–1921

State and Geographic Division	Thousands of Dollars			Per Cent of Total		
	1919	1920	1921	1919	1920	1921
Continental United States	**326,400**	**377,200**	**204,774**	**100.000**	**100.000**	**100.000**
New England	**18,323**	**19,867**	**14,696**	**5.612**	**5.267**	**7.177**
Maine	7,759	8,648	6,052	2.377	....	....
New Hampshire	526	660	513	.161	....	....
Vermont	857	985	766	.262	....	....
Massachusetts	3,907	4,072	3,141	1.197	....	....
Rhode Island	380	438	289	.116	....	....
Connecticut	4,894	5,064	3,935	1.499	....	....
Middle Atlantic	**41,438**	**42,433**	**35,142**	**12.695**	**11.249**	**17.158**
New York	15,067	14,640	12,117	4.616	....	....
New Jersey	10,743	12,252	9,452	3.291	....	....
Pennsylvania	15,628	15,541	13,573	4.788	....	....
East North Central	**30,590**	**31,632**	**21,106**	**9.372**	**8.386**	**10.306**
Ohio	13,206	13,433	8,868	4.046	....	....
Indiana	8,735	8,632	5,029	2.676	....	....
Illinois	2,996	3,100	2,409	.918	....	....
Michigan	4,873	5,498	3,985	1.493	....	....
Wisconsin	780	969	815	.239	....	....
West North Central	**6,169**	**7,440**	**2,939**	**1.890**	**1.972**	**1.435**
Minnesota	433	448	348	.133	....	....
Iowa	597	618	480	.183	....	....
Missouri	3,941	5,392	1,743	1.207	....	....
North Dakota	120	124	97	.037	....	....
South Dakota	34	35	19	.010	....	....
Nebraska	65	67	52	.020	....	....
Kansas	979	756	200	.300	....	....
South Atlantic	**185,701**	**220,902**	**106,139**	**56.897**	**58.564**	**51.838**
Delaware	1,222	2,559	1,984	.374	....	....
Maryland	7,610	7,804	5,262	2.330	....	....
District of Columbia	23	24	19	.007	....	....
Virginia	17,278	18,202	12,978	5.294	....	....
West Virginia	1,710	3,399	630	.524	....	....
North Carolina	48,797	64,179	28,411	14.950	....	....
South Carolina	52,547	65,958	27,383	16.100	....	....
Georgia	46,197	47,183	20,098	14.156	....	....
Florida	10,317	11,594	9,375	3.162	....	....
East South Central	**25,476**	**31,571**	**9,912**	**7.806**	**8.370**	**4.840**
Kentucky	3,597	3,253	1,770	1.102	....	....
Tennessee	3,525	3,743	972	1.080	....	....
Alabama	14,066	18,966	5,577	4.310	....	....
Mississippi	4,288	5,609	1,593	1.314	....	....
West South Central	**8,697**	**10,088**	**2,441**	**2.664**	**2.675**	**1.192**
Arkansas	2,573	3,384	467	.788	....	....
Louisiana	3,841	3,899	1,226	1.177	....	....
Oklahoma	452	468	273	.138	....	....
Texas	1,831	2,337	475	.561	....	....
Mountain	**807**	**835**	**816**	**.246**	**.221**	**.398**
Montana	126	130	101	.039	....	....
Idaho	106	110	85	.032	....	....
Wyoming	8	8	2	.002	....	....
Colorado	294	304	118	.090	....	....
New Mexico	113	118	31	.035	....	....
Arizona	41	42	33	.012	....	....
Utah	109	113	438	.033	....	....
Nevada	10	10	8	.003	....	....
Pacific	**9,199**	**12,432**	**11,583**	**2.818**	**3.296**	**5.655**
Washington	526	544	304	.161	....	....
Oregon	490	372	315	.150	....	....
California	8,183	11,516	10,964	2.507	....	....

the percentage distribution of these two items by geographic divisions for 1919.

TABLE XXIV. — PER CENTS OF TOTAL VALUES OF FARM BUILDINGS AS COMPARED WITH PER CENTS OF TOTAL NUMBER OF AUTOMOBILES ON FARMS IN EACH GEOGRAPHIC DIVISION, AS OF JANUARY 1, 1920[a]

Geographic Division	Per Cent of Total	
	Value of Farm Buildings	Number of Automobiles on Farms
Total — United States	100.000	100.000
New England	3.738	2.087
Middle Atlantic	11.670	7.684
East North Central	25.173	25.666
West North Central	27.244	32.288
South Atlantic	10.457	9.323
East South Central	6.508	4.012
West South Central	7.689	8.587
Mountain	3.147	4.599
Pacific	4.374	5.754

[a] Based on Census of Agriculture, 1920.

As might be expected, there is fairly good correlation between the value of farm buildings and the number of automobiles owned by farmers. It is, however, particularly interesting to note the gradation in ownership of automobiles as compared with the value of buildings from the older to the newer States. As we go west the number of automobiles on farms assumes greater importance as compared with the value of farm buildings. It appears that the East and the South have a greater share of the national total in the case of farm buildings than in the case of automobiles. For instance,

over 3.7 per cent of the total value of farm buildings is in New England, while the number of automobiles on the farms in that part of the country is only about 2 per cent of the total. The same condition appears in the Middle Atlantic, South Atlantic, and East South Central divisions. The very opposite is, however, true of the other divisions, particularly those lying west of the Mississippi. Thus, in the Mountain States the percentage representing the value of farm buildings and the percentage representing the number of automobiles are 3.1 and 4.6, respectively.

If we take the ratios of the percentages representing the value of farm buildings to those representing the proportion of automobiles and array them according to size, the geographic divisions shown in Table XXIV line themselves up as follows:

Division	*Ratio of Per Cent of Total Value of Buildings to the Per Cent of the Total Number of Automobiles on Farms*
1. New England	1.79
2. East South Central	1.62
3. Middle Atlantic	1.52
4. South Atlantic	1.12
5. East North Central	.99
6. West South Central	.89
7. West North Central	.84
8. Pacific	.76
9. Mountain	.68

The alignment is significant. It would appear that the distribution of automobiles, as compared with the value of farm buildings, follows, roughly at least, the historic development of the country. Building values represent an accumulation of long standing, while automobiles represent more recent wealth, which is naturally in evidence to a greater degree in the agriculturally more prosperous and newer sections of the country.

The position of the East North Central division in the above array is characteristic. Its share of automobiles on farms is proportionately the same as that of the total value of farm buildings. It truly marks the middle point between the East and the West at the present stage of development of the country. Of course, the geographic divisions are only rough groupings of States, and

yet, an examination of the figures indicates that an array of individual States would undoubtedly substantiate the general tendency indicated above.

Farm Expenses for Feed.

Feed consumed by livestock and poultry on the farm may be divided into three classes as follows:

1. Feed crops raised and fed on the home farm.
2. Feed purchased.
3. Pasture and range.

It is obvious that there is a wide variation in the proportions of each of the three classes of feed used in different States. It is reasonable to assume that in the "Corn Belt" States a large portion of the feed used is in the form of recorded crops, — that is, corn which comes off the home farms. In these States pasture is limited in quantity, and enters but little into the total value of feed consumed. The situation is entirely different in the Mountain States where the principal source of sustenance for livestock is the range.

The difference in the proportion of the three classes of feed used in the several sections of the country is well brought out in Table XXV. In this table, comparison is made for each geographic division between the percentages of the total livestock and the percentages of the estimated total value of feed used, exclusive of pasture and range. It will be seen that in the New England and Middle Atlantic States, the cost of feed is very high. These States have roughly about 6 per cent of all the livestock found on farms and account for over 11 per cent of the total feed bill. In the East North Central division, the percentage of total livestock approaches the percentage of total feed costs. In the West North Central States, the percentages of the two are almost identical. The same is practically true in the South Atlantic and East South Central divisions. In the West South Central division the relative amount spent for feed is considerably below the average for the country. But in the Mountain States the percentage of the value of feed is only one-half as great as the percentage representing livestock in that division, and the expense for feed per domestic animal is much lower there than in any of the other divisions. The

Pacific States show a relative cost of feed somewhat similar to that for the Middle West.

The reason for the variation in the value of feed used per animal in different parts of the country is, as suggested above, the difference in the proportions in which the three classes of feed are used.

TABLE XXV. — PERCENTAGE COMPARISONS BY GEOGRAPHIC DIVISIONS OF TOTAL LIVESTOCK AND TOTAL COST OF FEED, EXCLUSIVE OF PASTURE AND RANGE, 1919

Geographic Division	Per Cent of Total	
	Livestock[a]	Value of Feed (exclusive of Pasture and Range)
Total — United States	100.0	100.0
New England	1.4	2.9
Middle Atlantic	4.8	8.7
East North Central	18.9	23.9
West North Central	32.3	31.5
South Atlantic	8.4	8.3
East South Central	8.4	7.6
West South Central	13.6	8.8
Mountain	8.1	4.4
Pacific	4.1	3.9

[a] Based on total units of Livestock in each Division computed by weighting the total number of Horses, Mules, Cattle, and Swine in accordance with estimated value of feed crops consumed by each type of animal, as recorded by the U. S. Department of Agriculture.

It appears that in New England and the Middle Atlantic States a great deal of expensive feed is purchased from the mills. This, in addition to the fact that farm prices of feed crops are higher in the East than in the Middle West, causes feed expenses in the former section to be far above the average. It would seem that

in the Mountain States the livestock get comparatively little feed in addition to range.

To estimate with accuracy the total value of feed of all sorts used by farmers each year is not feasible. There are no basic figures for a reliable approximation of the value of feed in the form of pasture and range, and we must confine our estimates to feed of recorded crops and feed purchased from mills. But to estimate even this part of the feed costs presents a problem that is not easily solved. As already indicated, the source of the greater part of feed used by farmers is the home farm, — that is, each autumn the farmer reserves a certain portion of his crops for this purpose.

At what prices should the farmer charge up his feed, — at the prices prevailing at the time the crops are harvested, or at the time the crops are fed? In some years, the variations in feed prices from month to month are very great. For instance, in 1920 the average price per bushel of corn in January was $1.40, in June and July it was about $1.85, and in December it dropped to 67 cents.

It seems that, considering the available data, neither method would yield highly accurate results, and from a theoretical standpoint, both methods can be equally well defended. Fortunately, owing to the manner in which "crops fed to livestock" were handled in connection with estimating the income from all other crops, an error in the estimate of the value of crops fed is greatly minimized in its effect in the final results. It will be remembered that the total value of all crops used in our distribution by States was obtained by adding to the value of all the crops sold and eaten by farmers and families the value of seed and the value of crops fed to livestock on the farm; consequently, the exact amount of the value of feed to be subtracted as an expense has already been accounted for in the total agricultural gross income as a source of revenue, so that, in the case of the net agricultural income for the entire United States, one cancels the other, and there can be no question of error. As far as individual States are concerned, an error due to price changes would show only in the amount of feed sold to or purchased from other farmers, which forms only a small portion of the total value of feed in each State.

The prices at which the value of crops fed each year by farmers in the United States were computed are the same as those used by

W. I. King in computing the value of feed crops sold, which are averages of monthly prices, weighted in accordance with monthly sales. This probably makes a fairly close approach to average feeding conditions.

To the value of crops fed which come off the home farm must be added the amount spent by farmers on feed purchased from mills. The combined totals representing the estimated total value of feed used annually in the United States, excepting pasture and range, are as follows:

1919	$6,087,434
1920	6,187,497
1921	3,180,969

These totals have been distributed by States in accordance with index numbers described below.

If it were possible to calculate the relative value of pasture and range in each State, the problem of apportioning the farm expense for feed by States would be comparatively simple. The best criterion for the apportionment would then be the comparative feed requirements as gauged by the number and kind of livestock in each State. However, with pasture and range as unknown variables the total feed requirements as indicated by livestock cannot be utilized as a basis. A more laborious method was therefore adopted.

The value of feed used in each State in 1919 was approximated from figures of the *Census of Agriculture*, 1920, and information published by the Department of Agriculture, as indicated in the formula: $V = A - B + C + D + F$, where

- V is the total value of feed used
- A is the value of the portion of corn, oats, barley, and hay not sold off the farm (computed by multiplying the portion of total production not sold by the December 1 price)
- B is the estimated value of corn, barley, and oats reserved for seed
- C is the value of forage and hay
- D is the estimated value of other crops used as feed on the farm
- F is the amount of actual money spent by farmers for feed.

The values of V in the above formula as determined for individual States served as index numbers for the apportionment of the total value of feed used in the entire United States in 1919.

The index for apportionment of the costs of feed in the Census year 1919 must necessarily be used as a basis for the computation of index numbers to be employed in the apportionment of this item of expense among the States in the intercensal years. The necessary adjustments for the years following 1919 were made by multiplying the 1919 indices by the ratios for each State of the total number of livestock in the given year to the total number of livestock in 1919.[1]

No correction is made in the index numbers used in the apportionment of the 1920 feed. It appears that some of the 1920 livestock data, as reported in the *Year Book* of the Department of Agriculture, are computed on the basis of the 1909 Census, which makes it impossible to use them with accuracy in connection with 1919 figures reported by the 1920 Census. An examination of the figures for the number of swine in 1920, which are found to be comparable with 1919 figures, shows that the differences between 1919 and 1920 are too slight to affect the index materially. The 1919 index is, therefore, used also for 1920.

Table XXVI gives a comparison of the estimated farm expenses for feed, exclusive of pasture and range, in the different States for 1919, 1920, and 1921. It will be seen that feed costs at farm prices in the West North Central States in 1919 were nearly two billion dollars, of which five hundred and fifty-nine million was the share of Iowa alone. The East North Central and the West North Central States combined consume about 55 per cent of the total value of feed. The New England States together with New York, New Jersey, and Pennsylvania consume about 11 per cent of the total, the South about 24 per cent, and the West, including the Mountain and Pacific divisions, only about 8 per cent of the total, of which over 2 per cent is attributed to California. Of the individual States with a feed cost of over 5 per cent of the total,

[1] The total amount of livestock in each year was computed for this purpose by adding the aggregates (properly weighted with respect to feed consumption) of each class of livestock in each State as reported by the Census and the Department of Agriculture. The weights assigned to each class of livestock are in accordance with the proportionate amount of feed crops consumed by different classes of domestic animals as reported in *Farmers' Bulletin No. 629* of the United States Department of Agriculture.

TABLE XXVI.—FARM EXPENSES FOR FEED[a] IN EACH STATE 1919–1920–1921

State and Geographic Division	Dollars (000's Omitted)			Per Cent of Total	
	1919	1920	1921	1919	1921
Continental United States	**6,087,434**	**6,187,497**	**3,180,969**	**100.000**	**100.000**
New England	**175,805**	**178,695**	**92,344**	**2.888**	**2.903**
Maine	42,916	43,622	21,822	.705	.686
New Hampshire	21,245	21,545	11,134	.349	.350
Vermont	40,299	40,961	22,012	.662	.692
Massachusetts	39,386	40,083	20,390	.647	.641
Rhode Island	5,296	5,383	2,958	.087	.093
Connecticut	26,663	27,101	14,028	.438	.441
Middle Atlantic	**531,372**	**540,107**	**280,721**	**8.729**	**8.825**
New York	257,864	262,102	135,955	4.236	4.274
New Jersey	36,646	37,249	19,277	.602	.606
Pennsylvania	236,862	240,756	125,489	3.891	3.945
East North Central	**1,452,218**	**1,476,089**	**751,822**	**23.856**	**23.635**
Ohio	313,138	318,285	160,162	5.144	5.035
Indiana	282,944	287,595	146,579	4.648	4.608
Illinois	394,161	400,640	196,520	6.475	6.178
Michigan	186,336	189,399	98,451	3.061	3.095
Wisconsin	275,639	280,170	150,110	4.528	4.719
West North Central	**1,915,464**	**1,947,147**	**997,064**	**31.466**	**31.344**
Minnesota	254,211	258,390	133,601	4.176	4.200
Iowa	558,862	568,180	286,081	9,181	8.993
Missouri	325,652	331,021	168,345	5.350	5.292
North Dakota	92,833	94,359	48,796	1.525	1.534
South Dakota	160,526	163,164	79,779	2.637	2.508
Nebraska	292,910	297,774	153,859	4.811	4.837
Kansas	230,470	234,259	126,603	3.786	3.980
South Atlantic	**502,944**	**511,211**	**269,269**	**8.262**	**8.465**
Delaware	9,192	9,343	4,899	.151	.154
Maryland	43,343	44,055	22,967	.712	.722
District of Columbia	183	186	95	.003	.003
Virginia	111,156	112,984	58,053	1.826	1.825
West Virginia	53,691	54,574	28,374	.882	.892
North Carolina	98,312	99,928	52,677	1.615	1.656
South Carolina	69,153	70,290	37,408	1.136	1.176
Georgia	100,504	102,155	53,854	1.651	1.693
Florida	17,410	17,696	10,942	.286	.344
East South Central	**462,341**	**469,940**	**235,487**	**7.595**	**7.403**
Kentucky	152,125	154,626	77,329	2.499	2.431
Tennessee	151,273	153,759	76,566	2.485	2.407
Alabama	80,293	81,613	41,671	1.319	1.310
Mississippi	78,650	79,942	39,921	1.292	1.255
West South Central	**535,303**	**544,118**	**286,105**	**8.794**	**8.994**
Arkansas	88,511	89,966	45,710	1.454	1.437
Louisiana	47,299	48,077	24,589	.777	.773
Oklahoma	146,464	148,871	74,594	2.406	2.345
Texas	253,029	257,204	141,212	4.157	4.439
Mountain	**271,777**	**276,031**	**142,922**	**4.464**	**4.494**
Montana	49,917	50,738	26,561	.820	.835
Idaho	45,473	46,221	23,380	.747	.735
Wyoming	23,740	24,131	12,406	.390	.390
Colorado	74,997	76,230	38,998	1.232	1.226
New Mexico	24,602	24,924	12,743	.404	.401
Arizona	16,923	17,086	9,376	.278	.295
Utah	25,811	26,235	13,932	.424	.438
Nevada	10,314	10,466	5,526	.169	.174
Pacific	**240,210**	**244,159**	**125,235**	**3.946**	**3.937**
Washington	60,813	61,813	31,269	.999	.983
Oregon	51,256	52,099	26,816	.842	.843
California	128,141	130,247	67,150	2.105	2.111

[a] Includes value of Crops fed off the farm and Feed purchased.

Iowa leads with about 9 per cent, and is followed by Illinois, Missouri, and Ohio.

Farm Expenses for Seed.

The production of crops is very unlike the production of other commodities. In manufacturing processes, for instance, the amount of raw materials used determines quite accurately the amount of product to be expected, and vice versa. Thus, when it is decided to construct ten locomotives of specified size, it may be computed beforehand just how much steel will be required. Should the number to be constructed be reduced to five, there would correspondingly be a 50 per cent reduction in the amount of steel to be used. It is not so, however, with agriculture. Seed, which may be considered as the raw material entering into crop production, remains an unknown function of the amount of crops produced until the harvest is gathered. All the farmer can do is to plant a certain amount of seed per acre and then trust to favorable weather conditions to get a return on his investment and labor. Not only is there an uncertainty from year to year as to the yield per unit of seed in a given place, but there is also great variation in the average yield per acre in different parts of the country.

In the first two columns of Table XXVII, we have the maxima and minima of average yields per acre for selected crops in the different States. The ranges between the lowest and the highest average yields are apparently very great. For instance, in the case of wheat, the highest yield per acre is about three times as great as the lowest. For corn, the variation is even greater, the highest being 48 bushels and the lowest only 12 bushels.

It follows, then, that even when dealing with one single crop, to know merely the amount produced gives us little information as to the amount of seed used. However, in our problem, we have the added difficulty of having to deal with totals including a great number of crops produced in different proportions in different parts of the country. Other things being equal, do seed requirements for the different crops correspond with the yields per acre? The answer to this is found in Table XXVII. It will be noticed that the United States average yield per acre for wheat is 13.8 bushels. The approximate average requirements of seed per acre for wheat

are 1.38 bushels which gives a ratio of yield to seed of 10. In the case of corn, we have an average yield of 28.1 with seed requirements of only 0.16 bushels per acre, a ratio between the two of 175. The ratio of yield of oats to the seed requirements is 13.4, barley 12.9, rye 9.5, and potatoes 11.3. These figures make it obvious that in the State where corn, for instance, is the principal crop, the seed requirements are normally rather small in comparison with the State where wheat or rye is the main product.

TABLE XXVII. — AVERAGE YIELD PER ACRE COMPARED WITH AVERAGE SEED REQUIREMENTS PER ACRE FOR SPECIFIED CROPS[a]

Crop	Average Yield in Bushels per Acre, 1917–1921			Approximate Seed Requirements in Bushels per Acre	Ratio of Yield to Seed
	Minimum[b]	Maximum[b]	Average for the Continental United States		
Wheat	8	24	13.8	1.38	10.0
Corn[c]	12	48	28.1	0.16	175.0
Oats	15	40	31.9	2.37	13.4
Barley	16	31	23.6	1.84	12.9
Rye	9	20	13.6	1.44	9.5
Potatoes	62	204	97.8	8.6	11.3

[a] Based on figures published in the *Year Book* of the Department of Agriculture.
[b] Approximate average for a single state.
[c] For grain.

The estimates of the total value of seed used each year on the farms of the different States are based on the acreage, the seed requirements per acre, and the farm price per bushel of the following crops: barley, beans, buckwheat, corn, cotton, flaxseed, oats, potatoes, rice, rye, soy beans, cow peas, wheat, tame hay,

and peanuts. The prices used in computing the totals are as of December 1 of the year when the seed was harvested.

The final estimates of the value of seed by States which are to be found in Tables XXXI, XXXII, and XXXIII, while answering the purpose at hand, cannot be considered as highly accurate. In the first place, it has been necessary to apply to each State the same average requirements of seed per acre for given crops. Such averages are necessarily fictitious in so far as any one State is concerned. The average seed requirements per acre of corn, for instance, are by no means the same in all States. Then again, there is the question of price. At what price should the farmer charge up the seed that comes from his own farm? Let us assume that he harvested the seed in August and planted it the following spring, say March. Let us also assume that the August price is 80 cents per bushel and that the March price is $1.00 per bushel. Should he compute seed at $1.00 or 80 cents per bushel? There is undoubtedly a good deal to be said in favor of either procedure. As already indicated, in our computations, the December prices were used. This is probably a good compromise, as the bulk of the crops is sold at about this time of the year, and the prices then prevailing are probably most representative of the prices the farmers would realize if they chose to sell, together with the other crops, the portion normally reserved for seed.

Farm Expenses for Binder Twine.

Farmers spend a considerable sum of money each year on binder twine. This commodity is used chiefly in connection with grain crops; consequently, the State estimates have been computed on the basis of the total production in bushels of the following crops: wheat, oats, barley, rye, buckwheat, and flax. The production data by States are derived from the *Year Books* of the United States Department of Agriculture. The final estimates appear in Tables XXXI, XXXII, and XXXIII.

Farm Expenses for Harness and Saddles.

An idea of the importance of harness and saddles in the expense bill of the American farmer may be obtained from the fact that at the time of the 1920 Census there were about 25,000,000 horses and mules on the farm. Nearly 22,000,000 were animals two

years of age and over. The annual cost of harness and saddles to all farmers in the country is as follows:

1919	$177,336,000
1920	194,397,000
1921	157,206,000

To obtain the amount spent by farmers on harness and saddles in each State, the above totals were distributed in accordance with the number of horses and mules two years of age and over in each State as of January 1, 1920, it being assumed that, on the whole, the number of grown animals will determine the amount of harness in use. The estimates by States for 1919, 1920, and 1921 are recorded in Tables XXXI, XXXII, and XXXIII.

Cost of Outside Labor and Material for Agricultural Buildings.

An item of expense which presents particular difficulty in estimating is the cost of farm buildings, fences, etc. The value of farm buildings as recorded in the Census of Agriculture does not offer any satisfactory clue, for the Census figures cover all buildings, the farmer's residence as well as his business buildings, and it is only in the business portion that we are interested at this time. Then, again, there is the question of labor and material. A considerable amount of the work connected with new buildings and repairs to old buildings is done by the farmer himself and his regular farm hands, and, in some sections of the country, a good portion of the material comes from the farm.

How much does the farmer spend on outside labor and additional material? Estimates of the cost of outside labor and materials entering into business buildings and farms must of necessity be approximations based on the scant evidence at hand. W. I. King's estimates of this item for the United States as a whole, which take into consideration maintenance and repairs of existing buildings, as well as new construction, were used in computing estimates by States, the basis for apportionment being the difference between the values of farm buildings in 1920 and 1910. (See Tables XXXI, XXXII, and XXXIII.)

Interest Paid Out on Farmers' Loans.

In computing the agricultural income of the country, the question of interest is considered under two heads:

1. Interest paid to banks and merchants, which is charged as a farm expense and is deducted from the gross agricultural income.
2. Interest on farm mortgages held by individuals, which item is not segregated from the total income from agriculture as an industry, the mortgage holders being considered as participating in the industry.

TABLE XXVIII. — PER CENT OF TOTAL BANK LOANS TO FARMERS IN EACH GEOGRAPHIC DIVISION, JULY 1, 1918, AND DECEMBER 31, 1920[a]

Geographic Division	July 1, 1918	December 31, 1920
Total	100.00	100.00
New England	3.24	2.27
Middle Atlantic	3.80	2.65
East North Central	19.55	18.64
West North Central	39.25	39.38
South Atlantic	6.73	7.66
East South Central	4.57	5.40
West South Central	9.58	11.57
Mountain	5.92	6.10
Pacific	7.36	6.33

[a] Based on Table XXVII, Report of the Joint Commission of Agricultural Inquiry, Part II, p. 97.

The amounts paid by farmers each year to banks and merchants to cover interest charges on loans are considerable. It has been estimated [1] that the amount of bank loans to farmers outstanding on December 31, 1920, was about $5,317,000,000. This amount at the rate of 7 per cent would show interest payments to banks alone of over $370,000,000. The total amounts of interest paid by farmers to banks and merchants, as computed by W. I. King,

[1] Joint Commission of Agricultural Inquiry.

are $430,429,000 in 1919, $503,056,000 in 1920, and $479,365,000 in 1921. To obtain estimates of the interest payments to banks and merchants by farmers in each State, the above totals for the entire United States have been distributed in accordance with indices based on the figures presented in the report of the Joint Commission of Agricultural Inquiry,[1] which show by States the amounts of bank loans to farmers, outstanding on July 1, 1918, and December 31, 1920. The State estimates appear in Tables XXXI, XXXII, and XXXIII.

Table XXVIII shows the distribution of bank loans to farmers in the form of percentages of the total bank loans outstanding against farmers in each geographic division on July 1, 1918, and December 31, 1920. It would seem that farmers of the Middle West depend upon borrowed capital more than those of any other section of the country. The West North Central States alone account for over 39 per cent of the total bank loans to farmers; the East North Central division comes next with about 19 per cent of the total, so that the two divisions together represent about 58 per cent of the total bank loans.

Business Taxes in Agriculture.

What proportion of the taxes paid by farmers in each State should be charged against agriculture as business taxes? This question presents another item of farm expense which, like the cost of business buildings and the cost of business use of automobiles, does not lend itself to exact measurements. This, again, is a case where the affairs of the farmer as an individual and as a business man are so intimately tied up that it is hard to determine the line of cleavage. Any mode of attack in the matter of business taxes must, therefore, be based on conjecture and judgment, rather than on measurable statistical facts. In his estimates of this item for the country as a whole, W. I. King has taken 30 per cent of the total taxes paid by farmers to be a reasonable charge against agriculture as an industry, the other 70 per cent being charged to the farmer as an individual. On this basis, he estimates the business taxes to be $132,555,000 in 1919, $166,278,000 in 1920, and $193,661,000 in 1921.

[1] Part II, p. 97.

The 1922 *Year Book* of the Department of Agriculture [1] furnishes figures of taxes paid on farm real estate in each State on a per acre basis. Using these data in conjunction with the farm acreage figures supplied in the Census of Agriculture, the annual farm taxes in each State were roughly approximated and then adjusted to correspond with the totals for 1919, 1920, and 1921 computed by W. I. King. The final estimates by States will be found in Tables XXXI, XXXII, and XXXIII.

[1] p. 1002.