

A FARM PROGRAM FOR BOURBON COUNTY

by

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INTRODUCTION

The purpose of this study is to analyze the farming systems conducted on typical farms of Bourbon county and to suggest improved systems which may be used by the individual farmer in arranging his farm program and to serve as a guide for the county agent and extension forces in building a county program.

Such an analysis involves the study of crop adaptation as evidenced by the acreage and yields of the more important crops over a period of years; the trends and present status of livestock production; the present combinations of enterprises on typical farms of the most usual sizes; the results of different systems as shown by cost of production records; the possibility of improving certain enterprises as evidenced by the practices of the best farmers and by experimental results; and the possibility of combining these enterprises into better farm systems for farms of different sizes.

The methods used in this study were: a historical study of yields, crop acreages, numbers of livestock and prices taken from the State Board of Agriculture reports; finding the prevailing practice on typical farms by an analysis of the county assessors' reports; an analysis of cost of production records on farms of the county; personal interviews with many farmers of this county; consideration

of experimental results and consultation with specialists as to different phases of crop and livestock production involved.

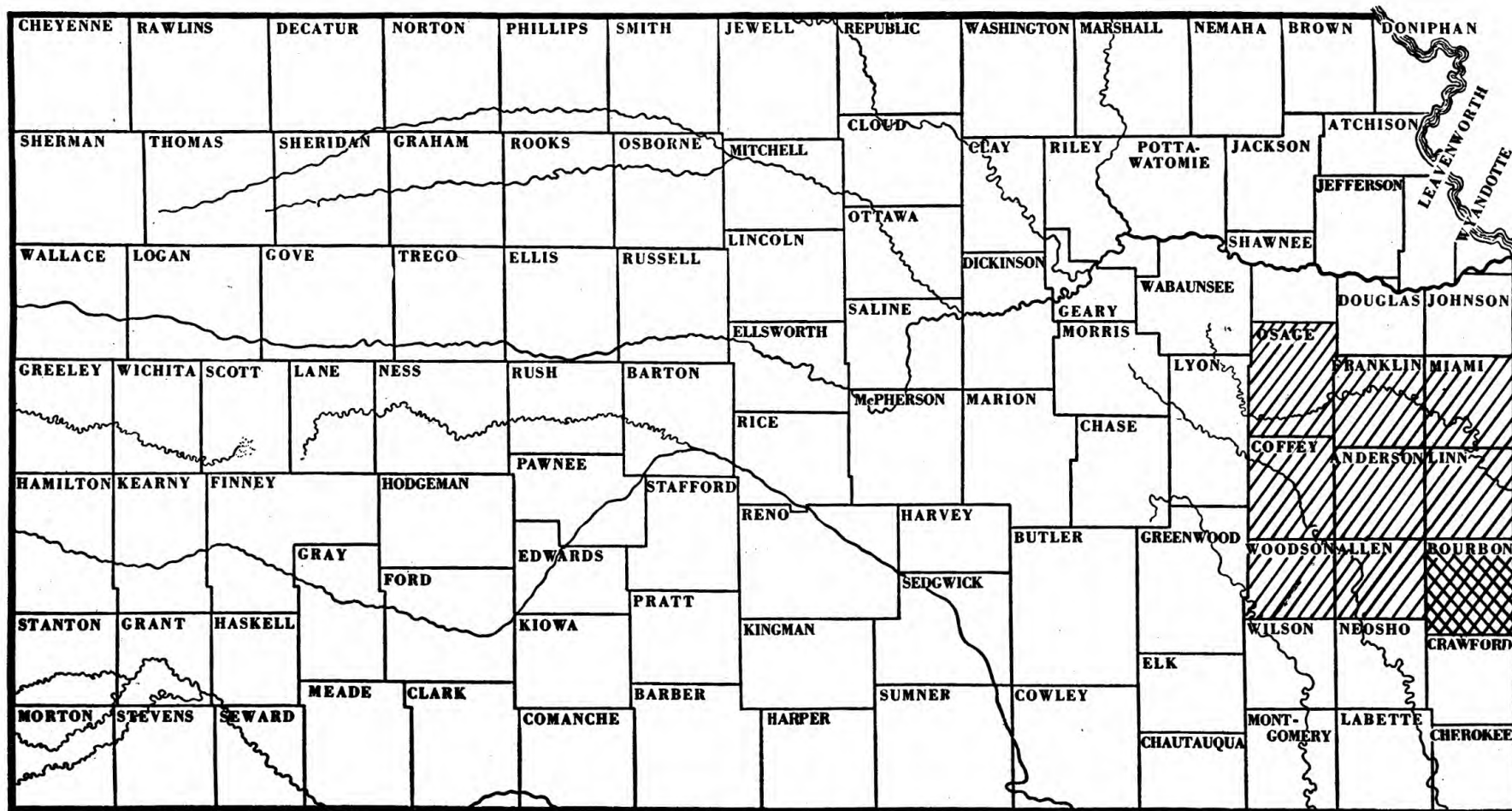
ACKNOWLEDGMENTS

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DESCRIPTION OF AREA

Bourbon county is located on the eastern border of Kansas adjoining Missouri and is in the third tier of counties from the southern border of the state. While all of the data were taken from Bourbon county they are applicable to a much larger area. This area is indicated in Figure 1. Conditions in these eight counties approximate those of Bourbon county.

The upland of the county is rolling. The soil is residual from limestone, sandstone, and shale. Most of the tilled soil is acid. It is a silt loam with a heavy subsoil and is low in phosphorus. About 17 per cent of the county is bottom land, the soil of which is of the Osage series which is predominately silt loam and silty clay loam. It is subject to frequent overflow.



Area of study.



Area where applicable.

Fig. 1—The location of county where study was made and area to which data are applicable.

Rainfall and Climate

The average yearly rainfall for the 10 years 1915 to 1924 was 40.93 inches. This rainfall is ample when properly distributed but crops quite often suffer from drought in July and August. Winters are not severe and the average growing season from the last killing frost in the spring to the first killing frost in the fall over a period of 10 years averaged 185 days.

Crops Adaptable

Much of the land in this county is rough and rocky or of light soil. Due to this fact much of the area is better adapted to hay and pasture than to the production of cultivated crops or small grain. Wheat cannot be grown as advantageously as on the more fertile and more level land of the wheat belt. Corn is a fairly certain crop even though the yield is not large. This crop with other feed crops is necessary for the livestock which must be kept to utilize the hay and pasture. Corn yields are usually slightly higher than the yields of grain sorghums. Grain sorghums find a special use as a silage crop and yield more silage per acre than corn. Alfalfa yields fairly well but the soil must be limed which makes the crop more expensive to grow here than in some localities. Sweet clover is being used

Table I. - Monthly rainfall at Fort Scott, Bourbon county, Kansas. (a)

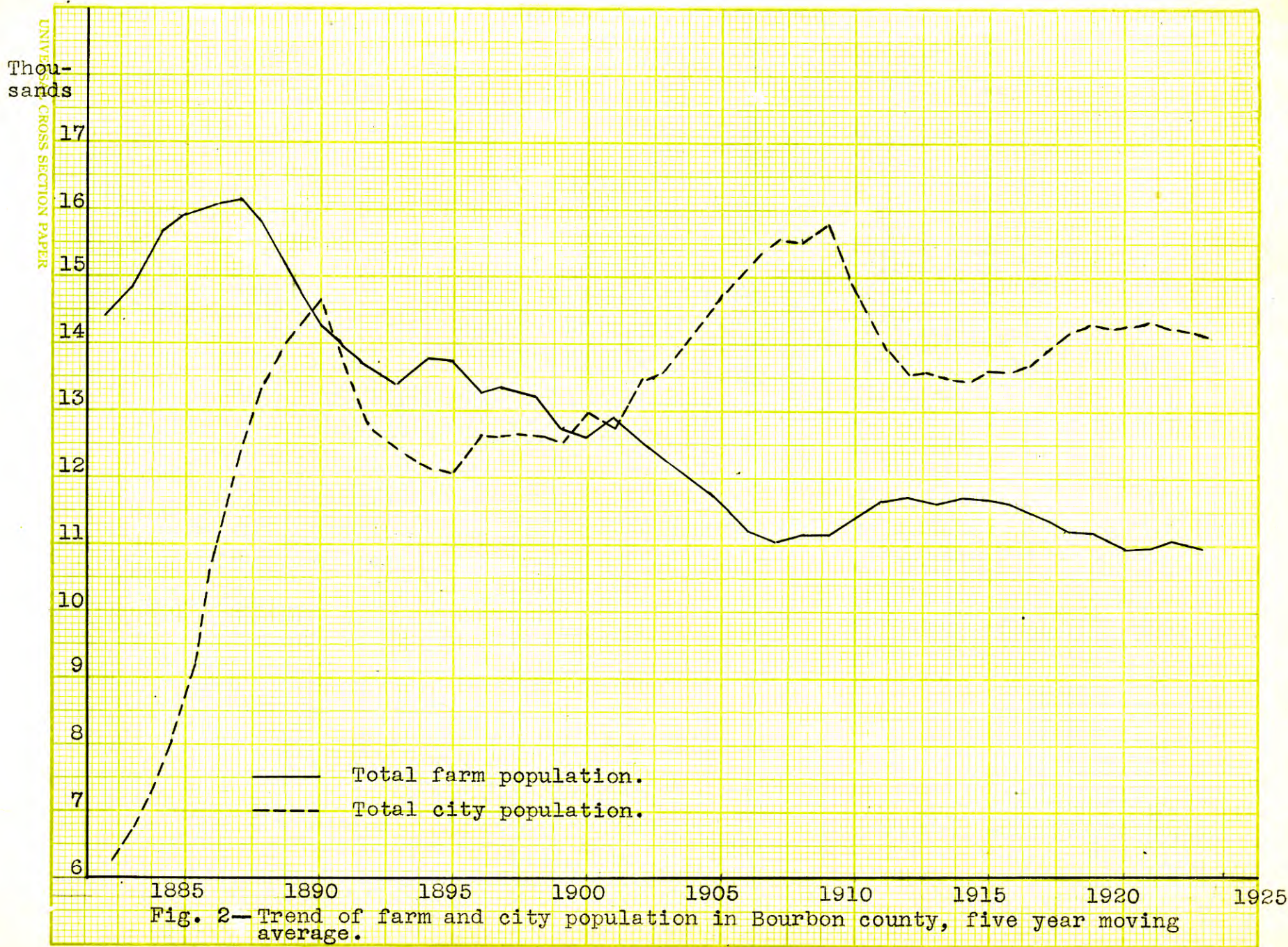
Month	10-year average 1915-1924	1925	1926
Jan.	1.89	.98	1.62
Feb.	1.05	1.02	1.84
Mar.	3.21	2.15	2.84
Apr.	4.52	5.05	3.06
May	4.58	1.54	2.78
June	5.83	6.35	5.75
July	4.34	2.44	1.12
Aug.	3.20	.64	4.68
Sept.	5.21	7.51	10.83
Oct.	3.26	3.33	5.74
Nov.	2.30	3.41	1.30
Dec.	1.54	1.21	2.24
Total	40.93	35.63	43.80

(a) Source - United States Weather Bureau records.

more extensively in recent years and is proving quite promising as a pasture crop. Soybeans are planted in the corn rows quite often and the two crops used for silage. Also, soybeans are occasionally used as a hay crop and the acreage could well be increased to bring up the legume acreage. Sudan has a place as a pasture crop.

HISTORY AND DEVELOPMENT

The first settlement in Bourbon county was made at Fort Scott by the government as a military post in 1842. The first white settler outside of the military force came the following year. The county was organized in 1855, being named for Bourbon county, Kentucky. By 1860 the population of the county was 6,101. According to the census reports the population increased to 28,575 in 1890 and has declined since that time. (Fig. 2) The latest available figures in the reports of the State Board of Agriculture show the county to have a population of 25,030 in 1925. This report divides the population into farm and city population including all persons in incorporated places in the latter group. The farm population has decreased since 1886. While the trend of the city population has been upward it has not accounted for the total loss. More of the settlers moved farther west as the country was opened up. The improved land per farm reached its peak in about 1890 and the number



of farms was greatest in 1900. It was during this decade, 1890-1900, that the agriculture of this region reached its greatest development. On the whole, general farming has been practiced. Only within the last 10 or 15 years has an attempt been made to develop the dairy industry. The acreage per farm has changed but little since 1890. At that time the average area per farm was 146.5 acres and in 1925 the area per farm was 152.1 acres. (Table II).

Changes in Acreage of the Principal Crops

Corn has had no close competitor among other grain crops over the whole period. Wheat and oats have had periods of expansion which have been short lived, especially those of wheat. Kafir and the grain sorghums have been increasing in importance for the past 25 years. Flax was of considerable importance in the 80's and late 90's but its production has greatly decreased until the acreage is now almost negligible. Sorghum has been grown some for syrup but the acreage has always been relatively small.

Corn production has had three important periods of expansion. The first period of expansion extended to 1885 and then declined to a low point in 1890. This period corresponds quite closely to the expansion and decline in farm population. The second and most important period of expansion of the corn acreage reached a peak about 1899, then

Table II. - Number of farms, land in farms, value of land and buildings per acre and population of Bourbon county, Kansas, 1860-1925.
(a)

Year	Farms in county	Land in farms	Average acreage per farm	Improved acreage per farm	Value of land and buildings per acre	Population
	Number	Acres	Acres	Acres	Dollars	Number
1860	976	189,483	194.2	23.0	2.39	6,101
1870	1,417	252,068	177.9	69.2	18.98	15,076
1880	2,165	290,339	134.1	94.8	13.73	19,591
1890	2,354	344,842	146.5	117.4	21.46	28,575
1900	2,535	382,151	150.7	111.0	19.07	24,712
1910	2,441	370,972	152.0	114.0	37.45	24,007
1920	2,517	401,550	159.5	113.6	69.26	23,198
1925	2,278	346,590	152.1	---	49.76	---

(a) Data from U. S. census.

again declined until about 1908. Much of this period was accompanied by a considerable expansion in the number of cattle and hogs. After 1908, the corn acreage again increased for a few years and then declined. In 1919, when the wheat and oats acreages were expanded, there were less than 50 thousand acres of corn. Since then the trend seems to have turned definitely upward. Acreage changes seem to have responded little to price.

Wheat has had four well-defined periods of expansion, the world war period being the one of most importance. The first was in the late 70's and early 80's, the second in the early 90's, and the third from 1904 to 1909. The greatest expansion was due to the world war but was of little significance until 1918. The peak was reached in 1919 with more than 58 thousand acres. There has since been a decline in wheat acreage; in 1925 but slightly more than 2,000 acres were reported.

The kafir acreage has had a fairly steady increase for 25 years with the exception of the war period when there was some decline.

The oats acreage has had two periods of expansion, one in the 90's and the other in the war period. The latter appears to have been in response to price.

Prairie hay and timothy have been the chief hay crops. The acreage of prairie hay cut is not available over the

whole period. Timothy, both alone and with clover, was important from 1855 to 1915. The alfalfa acreage was greatly increased from 1913 to 1921. It was then allowed to decrease. Sweet clover and soybean hay are becoming more important in recent years. (See Figs. 3 and 4).

Changes in Numbers of Livestock

The production of livestock has always held an important place in the agriculture of the county, although the production has in many cases been erratic. This has been especially true of hogs, the number of which has fluctuated violently. Sheep were relatively more important for about a decade beginning in 1874. The trend with some interruptions has been slightly upward again since about 1906, but the industry is still of minor importance.

The trend in the number of milk cows and of other cattle has been quite similar, the similarity being less marked in recent years. There have been three periods of expansion, the peak of the first being in the early 80's, of the second about 1905 or 1906, and the third since the war. In general these periods correspond closely to those of the cattle industry for the country as a whole. The general trend in the number of milk cows has been upward since about 1905 but the rise has been gradual. The attempt to develop dairying has been comparatively recent. A conden-



Fig. 3—Acreage of grain crops in Bourbon county.
 Source - Biennial Reports, State Board of
 Agriculture.

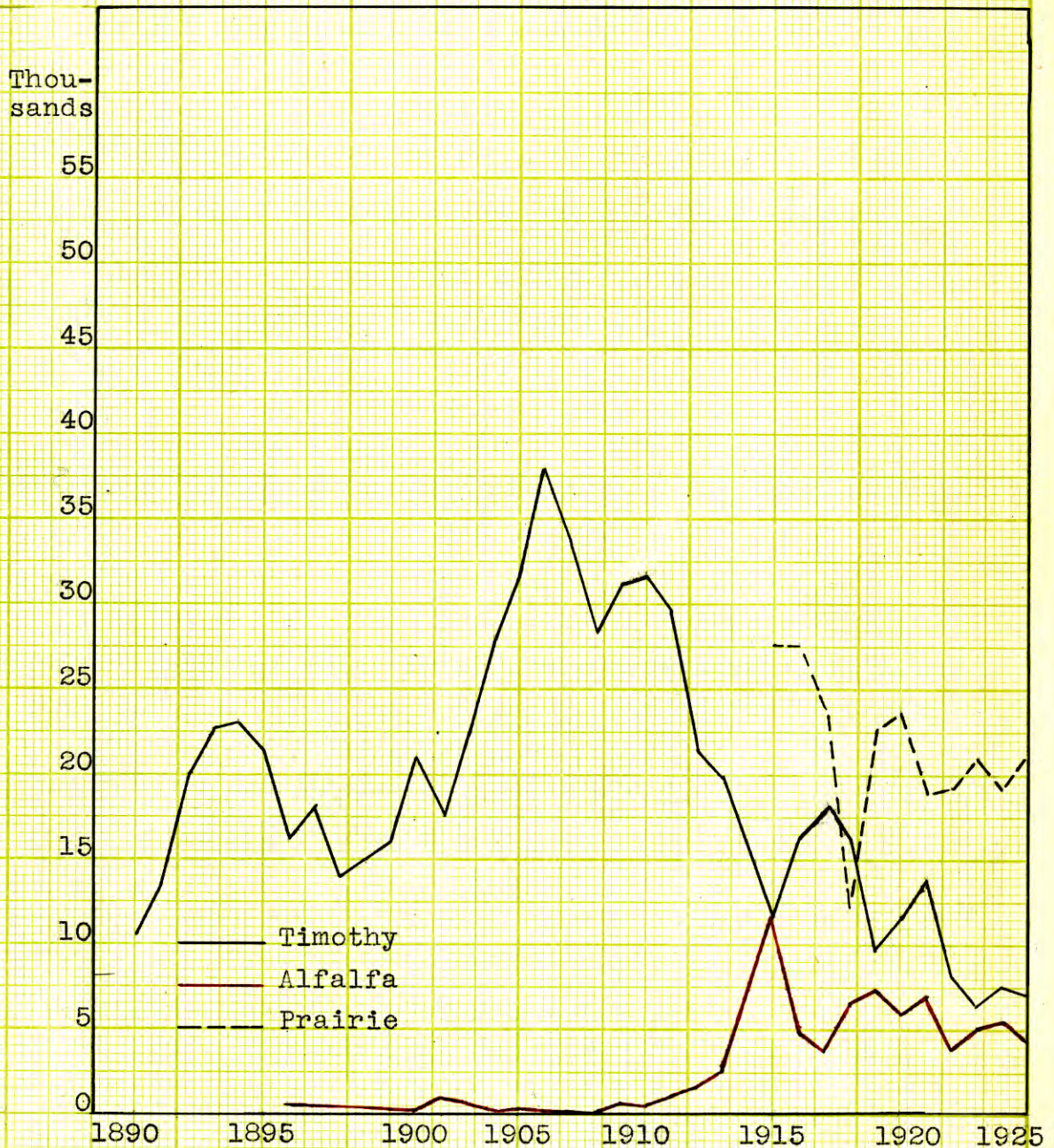


Fig. 4- Acreage of timothy, prairie hay, and alfalfa in Bourbon county.
Source: Biennial Reports, State Board of Agriculture.

sery opened for business at Fort Scott in 1918. If figures for dairy cows as distinguished from milk cows in general were available a greater increase since 1918 would no doubt be apparent.

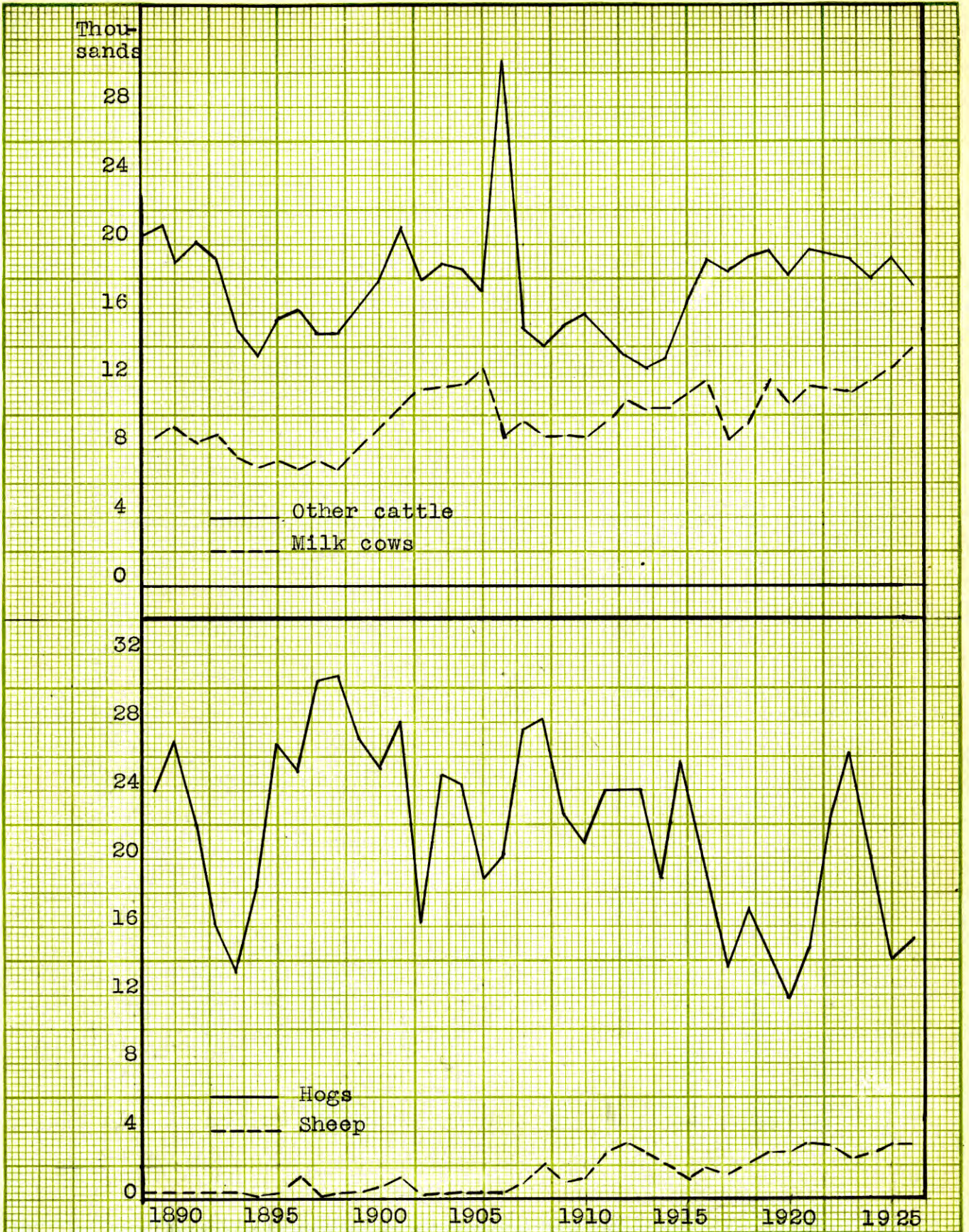
Hog production seems to be greatly affected by corn production. When the trend of the number of hogs is lagged one year it is quite similar to that of corn production. In the 90's and again in 1905 the number of hogs was large compared with the corn crop. However, the cattle population was relatively less in these periods. (See Fig. 5).

Trend in Crop Yields

Yields of the grain crops have been decreasing since the first settlement of the county, indicating a decreased fertility of soil due to continuous cropping. Yields of corn averaged more than 30 bushels in the 70's and early 80's but have declined to near 20 bushels per acre for the last 25 years.

Wheat yields have not declined as much as corn probably due to the fact that only a small acreage of wheat has been raised and only on land best suited to the growth of the crop. During the world war period when the wheat acreage was greatly increased the average yield dropped from 15 to 11 bushels per acre.

The yield of oats has taken the same general trend as



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Fig. 5—Numbers of livestock in Bourbon county.
 Source: Biennial Reports, State Board of
 Agriculture.

corn. The highest yields per acre were in the 80's with yields of from 30 to 35 bushels per acre. The yield for the last 25 years has been from 20 to 25 bushels per acre. (See Fig. 6)

Markets and Transportation

The Chamber of Commerce of Fort Scott has been especially interested in the dairy program of the county and was largely responsible for its inauguration. It was instrumental in obtaining a condensery at Fort Scott which opened for business in the spring of 1918. The condensery furnishes an excellent market for whole milk. In 1925 it was paying farmers from \$40,000 to \$60,000 per month for milk. The receipts of milk at the Fort Scott condensery have been as follows:

1921.....	16,220,987	pounds
1922.....	11,830,572	"
1923.....	16,299,009	"
1924.....	23,936,458	"
1925.....	22,518,367	"
1926.....	24,396,141	"

The condensery is the center about which the dairy program is being built. Milk is bought on a graduated scale according to butterfat content. The Fort Scott creamery is estimated to have paid out \$75,000 for cream in 1925. Hard surfaced roads leading out from Fort Scott in all directions make it possible for farmers to have their milk and cream

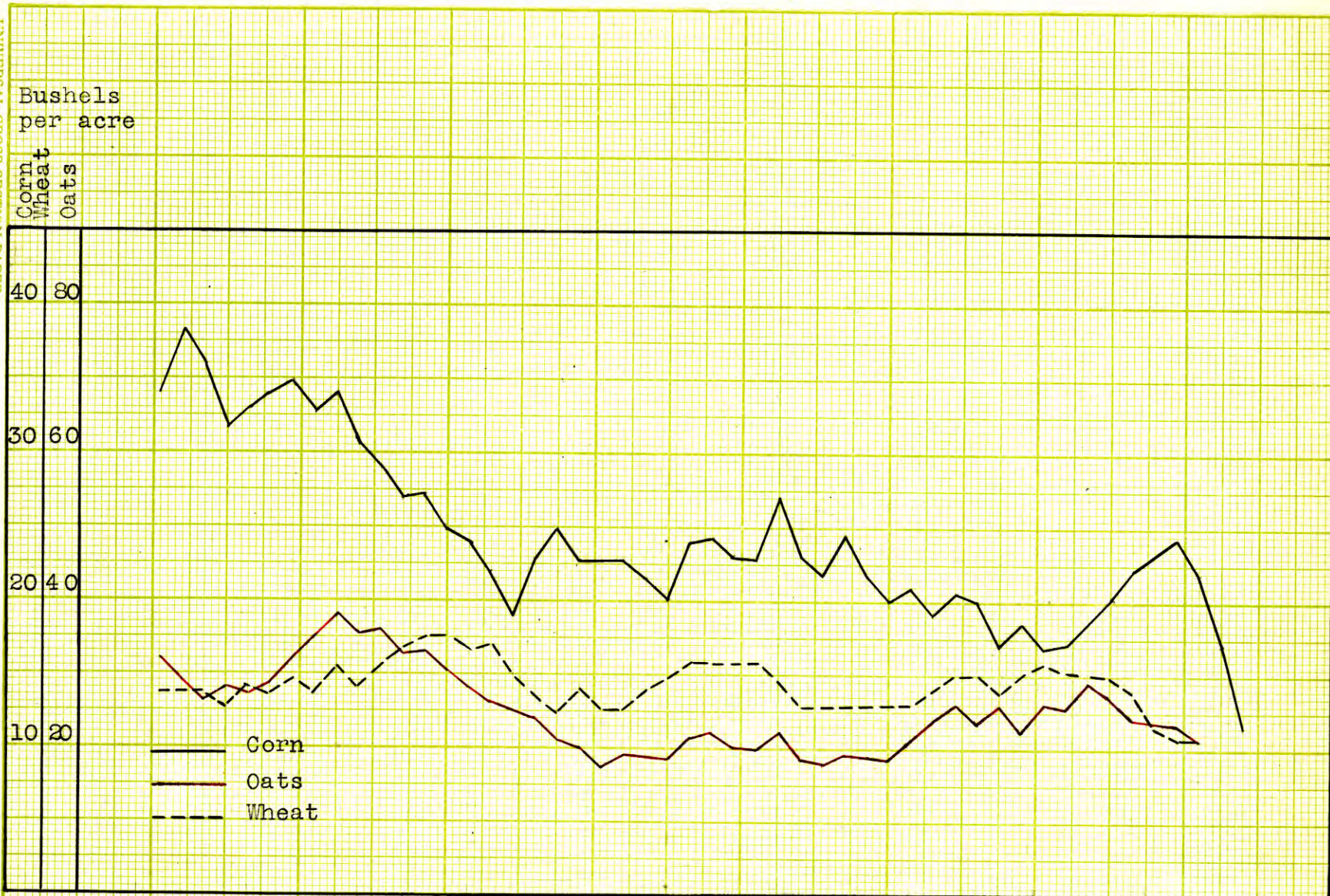


Fig. 6—Trend of yield of corn, oats, and wheat, five-year moving average.
 Source: Biennial Reports, State Board of Agriculture.

hauled in on practically every day of the year.

The county is served by three railroads which give it easy access to the larger terminal markets at Kansas City, St. Louis, and Wichita.

A county-wide cooperative livestock shipping association has been in operation for a number of years. In 1925 this association shipped out 284 cars of livestock, valued at \$325,000 with an estimated profit to the producers of \$28,000.

The local markets for grain, poultry, eggs, and other farm products are about the same as would be found in other Eastern Kansas towns of the size of Fort Scott.

THE PRESENT SYSTEM OF FARMING

Similarity of Crops and Livestock in Nine Counties of Area

Crops.—The percentage of the major crops grown in Bourbon county and other counties in relation to the total farm land of this area is shown in Table III and Figure 9. Pasture land takes up the largest percentage of the land in this area. Corn, hay crops, sorghum, oats, and wheat follow in the order named. These crops are adapted to all counties of the area and the acres of each in the different counties indicates a great similarity in crop conditions.

Livestock.—The number and kind of livestock per 100



Fig. 7 — Borden's condensery at Fort Scott, an excellent market for whole milk in Bourbon county.



Fig. 8 — Hard surfaced roads near Fort Scott enable farmers to bring products to market any day of the year.

acres of farm land is shown in Table III and Figure 10. Cows and chickens are important in all counties of the area and show little variation in numbers. Hogs and sheep, while relatively few in number, make up an important sideline on most farms of this region.

The Present Type of Farms

A farm growing corn as the most important grain crop and supplementing this with kafir and oats is typical for this section. Meadows of prairie hay or clover and timothy mixed are common and often give a surplus for sale above what is needed for livestock. Most farms have some land suited only for grazing and carry milk cows or stock cattle to utilize this pasture.

According to the United States agricultural census for 1925, 15 per cent of the farms of the county were of less than 50 acres, 22 per cent contained from 50 to 99 acres, 36 per cent from 100 to 174 acres, 14 per cent from 175 to 259 acres, 11 per cent from 260 to 499 acres and 2 per cent more than 500 acres. Most of the farms in these different size groups are 80 acres, 160 acres, 200 acres and 320 acres respectively. The 160-acre farm is most usual probably due to the fact that many farms in Bourbon county were homesteaded as 160-acre units. In general the larger farms have a higher percentage of the land in pasture than the small

Table III. — Farm area, percentage of farm area in each crop, and livestock per 100 acres, nine counties in eastern Kansas. (a)

County	Farm area	Per cent farm area in:						Number of livestock per 100 acres farm land			
		Wheat	Corn	Oats	Sorghum	Hay	Pasture	Cows	Sows	Ewes	Chickens
Woodson	233,571	2.1	13.8	3.1	8.4	28.9	35.8	3.4	.4	.7	69
Anderson	305,562	2.2	18.5	4.6	6.4	19.6	38.3	4.6	1.0	1.1	100
Bourbon	346,590	1.0	20.2	4.1	5.3	14.9	43.5	5.2	1.0	.8	77
Linn	346,089	.5	22.7	3.1	4.2	13.5	41.9	4.0	1.2	1.5	90
Osage	417,321	.9	23.9	4.0	6.9	13.8	42.8	4.2	1.4	.8	90
Franklin	312,280	1.5	22.8	6.3	5.3	14.6	40.1	4.7	1.2	1.6	96
Miami	317,369	2.9	26.2	7.5	2.1	12.9	38.2	4.4	1.9	2.0	96
Allen	274,052	1.3	23.7	4.6	8.7	14.9	32.5	4.6	1.0	.9	101
Coffey	365,201	4.2	23.6	5.5	8.8	15.2	32.5	3.7	1.3	.7	118

(a) Source - 1925 census.

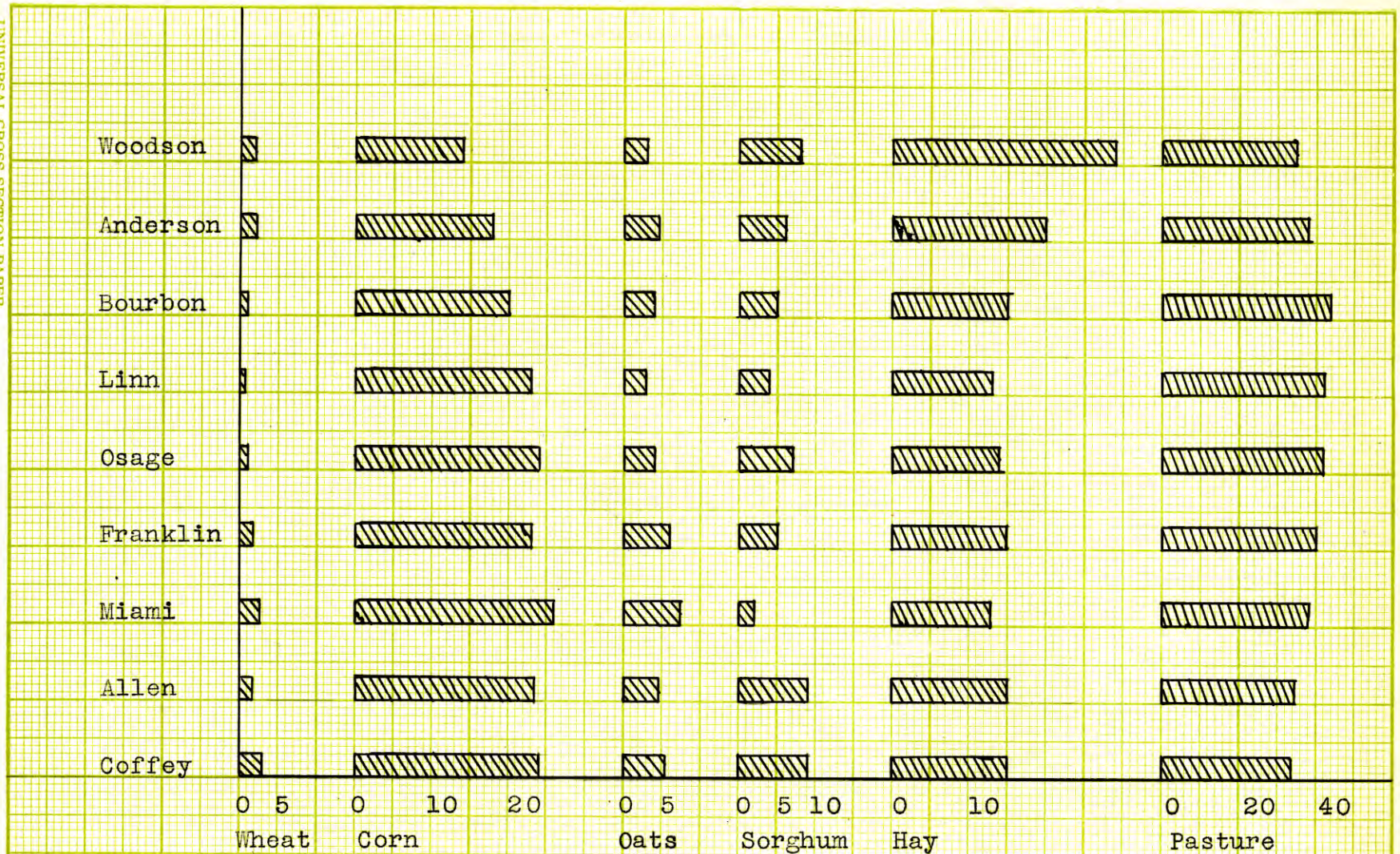


Fig. 9 - Crops and pasture in per cent of farm land, nine counties in eastern Kansas. Data 1925 census.

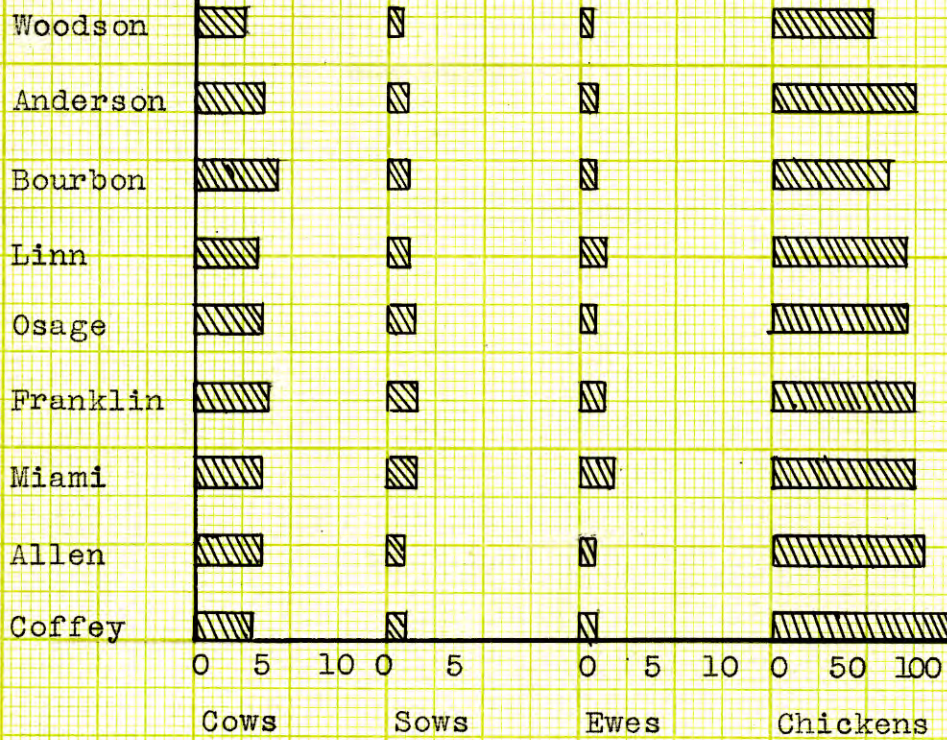


Fig. 10 — Number of livestock per 100 acres farm land, nine counties eastern Kansas. Data 1925 census.

farms. (See Table IV).

The crop acres on each farm and to a certain extent the number and kind of livestock kept depend upon the acres that can be broken out and cultivated successfully. Much of the land is rough and stony and suitable only for pasture. Table V shows the acres in crops and the numbers of livestock kept on typical farms in five representative townships of the county. In general these are the systems most commonly found on the farms of this section.

Corn is grown on practically all farms. Grain sorghums, kafir, milo, or feterita are grown on most of the farms for grain or forage. Oats is the principal small grain crop. Flax and wheat for cash crops are reported on about 14 per cent of the farms. A few farmers grow sorghum for syrup.

Clover and timothy or timothy alone is the most important hay crop in some sections. In other sections prairie hay is the most important hay crop and an important source of income on some farms. Both prairie and tame hay are cut on most of the farms. Alfalfa is reported on about 24 per cent of the farms and clover and soybeans on only a few farms. Legumes do poorly on acid soils but most farms have some land which would grow legumes if the soil were limed and fertilized. Annual hay crops, such as sudan and cane, are grown on a few farms. Approximately one-third of the farm land on the typical farms is in prairie pasture. Sweet clover for

Table IV. — Per cent of farms grouped according to size, and acres in crops, pasture, and waste land. (a)

Farms by size	Under 50 acres	50-99 acres		100-174 acres			175-259 acres	260-499 acres	Over 500 acres
Per cent of farms in each group	15	22		36			14	11	2
Per cent of total farms	15	11	6	11	8	5	5	5	2
Most common size farms	-	80	80	160	160	160	200	320	-
Acres in crops	-	45	55	105	80	110	120	165	-
Acres in pasture	-	30	20	45	60	40	70	140	-
Acres in farmstead and waste	-	5	5	10	20	10	10	15	-

(a) Source - Bourbon county assessors' reports.

Table V. — Acres in crops and number of livestock on typical farms, Bourbon county, Kansas, 1926. (a)

Size farm (acres)	80	80	160	160	160	200	320
<u>Crops:</u>							
Corn	20	25	40	30	60	45	50
Oats	5	10	20	20	20	25	25
Kafir	10	5	10	10	10	10	15
Alfalfa	-	-	-	-	-	-	-
Timothy and clover	-	10	15	15	10	10	25
Prairie hay	10	5	15	-	5	25	40
Other hay	-	-	5	5	5	5	10
Prairie pasture	30	20	45	60	40	70	140
<u>Livestock:</u>							
Milk cows	3	4	6	4	6	6	8
Other cattle	5	4	6	4	6	6	20
Brood sows	1	1	2	2	2	2	3
Poultry	80	75	75	75	60	60	70
Horses	3	3	5	4	5	6	8

(a) Source - Bourbon county assessors' reports.

pasture is grown on a few farms.

On the 160-acre farms 110 of 222 farms had more than five milk cows and only 28 more than 10 cows. On the 80-acre farms 30 of 101 farms had more than five cows and only two had more than 10 cows. Nearly all of the larger farms had more than five cows and 10 of 38 had more than 10. Although dairying is probably the most important of the livestock enterprises but few farmers have gone into the dairy business on a large scale. A typical farm of 160 acres would have 25 to 40 per cent of the land in native pasture or prairie hay. The cropping system would include approximately 40 acres of corn, 10 of kafir, and 20 of oats. Approximately 15 acres of timothy or timothy and clover, 15 acres of prairie hay, five acres of cane or other hay crop would be typical of farms of this size.

About five head of horses are kept for farm work on the typical 160-acre farm. About six head of cows, six head of young cattle, and a farm flock of poultry are typical. On farms from which cream is sold, one or two brood sows are usually kept and some pork is produced for sale. On farms where whole milk is sold few, if any, hogs are kept.

On smaller farms the organization is much the same as on farms of 160 acres, but the enterprises are conducted on a smaller scale. Larger farms typically have a higher proportion of the land in pasture and keep more stock cattle.

The Organization of Farms From Which Records Were Obtained

Complete records were obtained from 21 farms in the county in 1925 and 15 farms in 1926. These farms received the major portion of their income from the sale of dairy products and in this respect are not representative of all of the farms of the county. However, these farms are widely scattered and in respect to soil, climate and marketing conditions, are similar to other farms in the county. Crop yields and livestock production obtained on these particular farms can be duplicated on typical farms if the same practices are employed.

Crops and Livestock.—As on the typical farms in the county the major portion of the crop land was planted to corn, kafir, and oats. More legume and feed crops were grown, however. Of the 15 farms from which records were obtained in 1926, five grew soybeans for seed or hay, and alfalfa was grown on each of the remaining farms. Four farms had sweet clover for pasture. Nearly all of the farms had timothy and clover mixed or timothy alone for hay. On the average farm one-half of the area was in prairie pasture. The average crop area per farm in 1926 was 115 acres and the average pasture area was 110 acres.

None of the farms had less than six cows and nine of the 15 farms in 1926 had more than 10 cows. The dairy herds

ranged from six to 45 cows in size. The stock cattle on these farms ranged from 2.75 to 46.24 animal units. On most farms the dairy cows and young stock enough to replace the milking herd were all of the cattle that were kept. Stock cattle were the exception on these farms.

There were more than double the number of poultry on these farms as compared with the typical farms. About one-half of the farms produced some pork but only one farm made pork production a major enterprise. Horses were used for farm power, only two farms doing any significant amount of field work with a tractor.

Distribution of Investment.—The average of these farms represented an investment of \$16,160 on March 1, 1926. Of this amount 76 per cent was invested in land and buildings and 14 per cent in livestock. The remaining 10 per cent was invested in equipment and supplies. The average value of land alone was \$36.00 per acre. The average value for the county was reported by the census of 1925 as \$39.13 per acre. The dairy farms have a larger investment in livestock than do the general farms in the county. Table VI shows the average distribution of the investment on 15 owned farms on March 1, 1926.

Income and Expenses.—The importance of dairying on the farms included in the study is shown by Table VII. Nearly one-half of the gross income in 1926 was from the sale of

Table VI. — Average distribution of investment on 15 owned farms in Bourbon county.

Average investment in:	March 1, 1926	
	Amount	Per cent
Land	\$8,602.00	53.2
Buildings	3,624.51	22.4
Livestock	2,331.47	14.4
Equipment	850.15	5.3
Feed and supplies	594.84	3.7
Other assets	56.70	.4
Cash	99.96	.6
Total investment	16,159.63	100.0
Liabilities	4,761.97	29.5
Net worth	11,397.66	70.5

dairy products and two-thirds of the receipts were from cattle. Only 5 per cent of the receipts were from sales of crops. Similar data for the county as a whole are not available, but the typical farm would obtain a higher proportion of its receipts from the sales of crops and less from dairy products. The average receipts on 15 owned farms in 1926 were \$3,438.79 per farm.

Table VII. — Average distribution of farm receipts on 15 Bourbon county farms, 1926.

Sales	Amount	Per cent of total
Dairy products	\$1,590.16	46.24
Cattle	693.11	20.16
Hogs	429.71	12.50
Poultry and eggs	379.00	11.02
Crops	180.08	5.24
Miscellaneous	144.40	4.18
Horses	22.33	.65
Total	\$3,438.79	100.00

One of the largest items of expense on these farms is purchased feed. Practically all dairy farmers purchase protein supplement for the dairy ration and many purchase some grain as well. Expenses for new equipment, livestock, and taxes are also important. Most of the work on these farms is done by the farm operator and members of the family so the average expense for hired labor is low. The total expense per farm was \$2,706.29. Table VIII shows the distri-

bution of expenses on these farms.

Table VIII. - Average distribution of farm expenses on 15 Bourbon county farms, 1926.

Purchases	Amount	Per cent of total
Livestock purchased	\$476.69	17.61
Feed	460.39	17.01
Interest and commission	292.79	10.82
New equipment	272.60	10.07
Taxes	252.91	9.35
Auto	178.52	6.60
Labor	173.60	6.41
Livestock expenses	163.33	6.04
Crop expenses	109.39	4.04
New real estate	104.33	3.85
Real estate Maintenance	77.02	2.85
All other expense	144.72	5.35
Total	\$2,706.29	100.00

Sources of Labor.—The farm family was the chief source of labor on these farms. In 1925 more than 86 per cent of all the labor done on these farms was the labor of the operator and his family. The following year the operator and his family did more than 84 per cent of all work. A little more than 2 per cent of the labor each year was exchange labor furnished by neighbors, chiefly at rush seasons. The remainder was 12 per cent the first year and 14 per cent the second and was hired labor. Only the larger farms depended to any great extent on hired labor. On 10 of the 15 farms more than 90 per cent of the labor was family labor. The labor per farm varied from 3,000 hours to almost 10,000 with

approximately 6,000 hours as average.

Variation in Farm Operators' Earnings.— On 15 owned farms the earnings of operators averaged \$845 in 1925 and \$741 in 1926. Figure 11 shows a wide variation in earnings between farms for each year and often a considerable variation on the same farm from one year to the other. Some particular circumstance may reduce the income on a well organized and well operated farm for one year. In 1925 the most successful farm paid \$3,042 to the operator above expenses and interest on the farm investment, while the least successful farm not only failed to reward the operator but lacked \$404 of paying expenses and interest on the farm investment. The range in 1926 was from \$24 to \$1,904. The same man received the smallest earnings for both years, while the operator with the highest earnings in 1925 was among the most successful in 1926. The most apparent factors affecting farm income are:

1. Size of farm
2. Number of cows
3. Production of livestock
4. Crop yields
5. Balance of crops and livestock on the farm.

The largest farm in the group gave the highest operator's earning in 1925 and was one of the most successful farms in 1926. Another farm which was as large as the average and had a herd of cows better than average had low crop

yields and the lowest operator's earnings. Another large farm with a large herd of cows had returns below average probably because of low production of the cows. Another farm with low returns in 1925 had increased earnings along with increased production per cow in 1926. Still another farm with good crop yields and good livestock production had low earnings because of a small farm and a small herd.

SUGGESTED FARMING SYSTEMS

The data obtained from the farm records in Bourbon county combined with the data from the county assessors' reports, census data, and information from other sources make it possible to give suggestions for farms of various sizes. In making these suggestions the more profitable farming systems followed on the farms of the county are taken as a starting point. The suggested farm organization used here is that combination of crop and livestock enterprises on farms of different sizes which appear to be most profitable under conditions as they exist at present and for years immediately ahead. Adjustments have been made on the basis of average yields and usual price relationships.

The requirements of man labor and horse work for crop production used in outlining these systems are shown in Table IX. The material requirements for crops are shown in Table X. Feed and labor requirements for the different

Farm
Numbers

1925

1926

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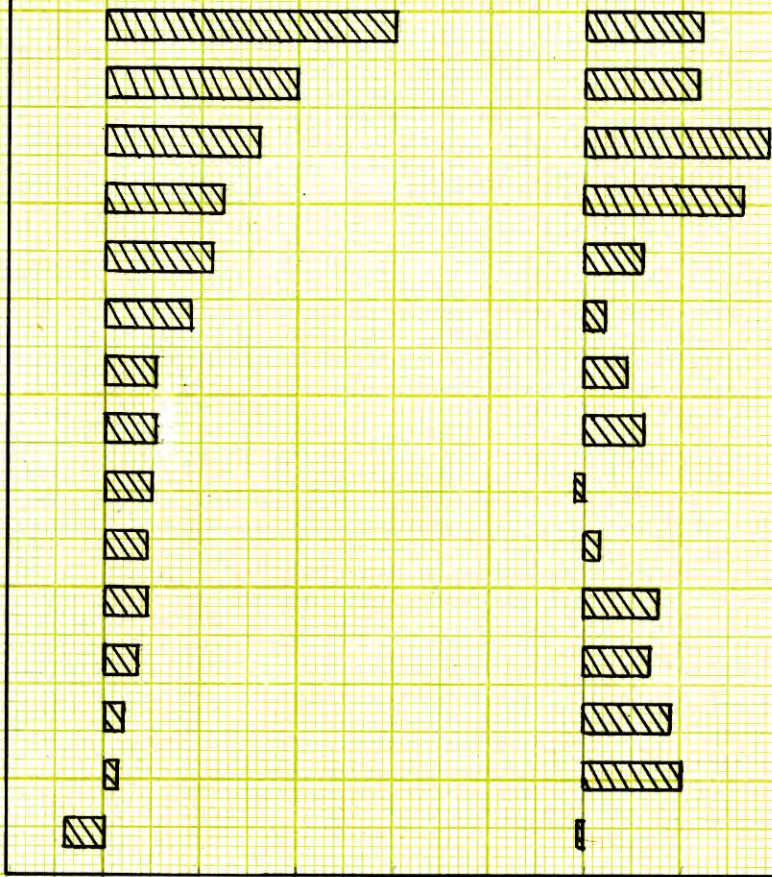


Fig. 11—Variation in farm operators' earnings on 15 Bourbon county farms, 1925 and 1926.

Table IX.—Standard labor requirements per acre for the various operations of crop production.

Operation	Size of machine	Man hours	Horse hours	Acres per 10-hour day	Operation	Size of machine	Man hours	Horse hours	Acres per 10-hour day
Seedbed preparation:					Harvesting small grain:				
Cutting stalks or breaking stalks	1-row stalk cutter	1.25	2.50	8.0	Binding	7' binder	1.00	3.00	10.0
Plowing	2-section harrow	.60	1.20	16.6		7' "	.80	3.20	12.5
	2-bottom, 14" gang	1.25	Tractor	8.0	Shocking		.80	--	12.5
	2 " 12" "	2.50	10.00	4.0	Stacking		2.00	2.00	5.0
	1 " 16" sulky	3.50	10.50	2.8	Stack threshing		.75	.50	13.3
	1 " 14" walk- ing	5.00	10.00	2.0	Shock threshing		1.75	2.00	---
Discing	7-foot	.75	3.00	13.3	Clover and timothy:				
Harrowing	2-section	.60	1.20	16.6	Cutting	5' mower	1.00	2.00	10.0
	2 " "	.50	1.50	20.0	Raking	10' rake	.67	1.34	15.0
	3 " "	.40	1.60	25.0	Stacking or		3.00	2.00	---
Planting row crops	2-row	.80	1.60	12.5	Baling		4.00	4.00	---
Cultivating row crops	2-section harrow	.50	1.00	20.0	Prairie hay:				
	3-section	.33	1.33	30.0	Cutting		1.25	2.50	8.0
	1-row	1.50	3.00	6.7	Raking		.67	1.34	15.0
	2-row	.83	3.33	12.0	Stacking, or		3.00	2.00	---
Sowing small grain	7-foot drill	1.00	3.00	10.0	Putting in barn, or		5.00	5.00	---
	" " "	.80	3.20	12.5	Baling		4.00	4.00	---
	Broadcast	.50	--	20.0	Alfalfa:				
Harvesting corn and kafir:					First cutting				
Binding	1-row	1.70	5.10	6.0	Cutting		1.00	2.00	10.0
Shocking		2.00	--	5.0	Raking		.67	1.34	15.0
Cutting by hand		7.00	--	1.4	Putting in barn		3.00	4.00	---
Fill silo		12.00	12.00	10.0	Second cutting				
Husking corn, from shock		4.00	6.00	2.5	Cutting		1.00	2.00	10.0
from standing stalk		5.00	10.00	2.0	Raking		.50	1.00	20.0
Topping kafir		5.00	5.00	2.0	Putting in barn		2.75	3.50	---
Threshing "		.75	.75	---	Third cutting				
					Cutting		1.00	2.00	10.0
					Raking		.50	1.00	20.0
					Putting in barn		2.25	3.00	---

classes of livestock are shown in Table XI. Yields used are shown in Table XII.

The man labor, horse work, feed, and material requirements are the production requirements taken from the records of farmers following similar systems of farming. The yields are those which seem most likely to be normally obtained. The approximate quantities of the different feeds required for the different classes of livestock on these farms are used.

The usual dates of performing different operations in crop production in the suggested systems on farms of the same sizes are used in estimating the labor needed for different cropping plans. Labor requirements for livestock are the usual quantities required on farms having livestock of like production. By summing up these quantities together with the miscellaneous labor we can determine the labor to be hired at various times during the year.

The prices used in determining the probable returns from the different farming systems are shown in Table XIII. The prices are those which seem most likely to be normally obtained. It is recognized that in any one year the prices of particular crops or livestock products may be higher or lower than those used. Since the quantities of products sold are given differences due to price changes can be easily computed.

Table X. - Material requirements per acre and threshing costs per bushel for crops.

Crop	Lime per acre	Seed per acre	Twine per acre	Threshing per bushel
	Tons	Pounds	Pounds	Cents
Corn	--	7	2	--
Oats	--	64	2	4
Kafir	--	6	3	4
Alfalfa	2	12	-	-
Sweet clover	2	12	-	-
Clover and Timothy	-	8	-	-
	-	4	-	-

Table XI. — Standard feed and labor requirements for livestock

	Cows	Other cattle	Poultry	Pork (a)		Work horses
	250# B.F.	Animal units	100 hens	100# pork		head
Corn and cob meal (lbs.)	850	500	--	--	--	--
Corn (lbs.)	--	--	6,000	375	400	2,000
Oats (lbs.)	300	--	1,000	--	--	1,000
Protein concentrates (lbs.)	250	100	--	--	--	--
Alfalfa (lbs.)	2,500	750	--	--	--	500
Other dry roughage (lbs.)	750	2,000	--	--	--	4,500
Silage (lbs.)	6,500	4,000	--	--	--	--
Bran (lbs.)	300	--	1,000	--	--	--
Shorts (lbs.)	--	--	--	15	25	--
Whole milk (lbs.)	--	450	--	--	--	--
Skimmilk (lbs.)	--	625	1,000	225	--	--
Tankage (lbs.)	--	--	--	5	15	--
Meat scrap (lbs.)	--	--	500	--	--	--
Grits (lbs.)	--	--	100	--	--	--
Days pasture	160	180	--	10	10	150
Man hours	130	25	350	4	2 $\frac{1}{2}$	70
Horse hours	10	7	16	1	$\frac{1}{2}$	10
Cash costs	\$0.75	\$0.50	\$1.00	\$0.10	.25	\$0.75

(a) A standard for pork production both with and without skimmilk is given as both methods of feeding are common in this area.

Table XII.—Standard yields of crops

Crop	Yield per acre
Corn	25 bu.
Oats	25 "
Kafir grain	30 "
Kafir silage	6 $\frac{1}{2}$ T.
Alfalfa	2 $\frac{1}{2}$ T.
Clover and timothy	1 $\frac{1}{4}$ T.
Prairie hay	1 T.

Table XIII.—Prices of farm products and cost of materials

Item	Price	Item	Price
Milk, 4% (cwt.)	\$2.15	Meat scrap (cwt.)	\$4.25
Butterfat (lb.)	.35	Alfalfa hay (ton)	15.00
Cows (head)	50.00	Timothy hay (ton)	11.00
Heifers (head)	40.00	Prairie hay (ton)	8.00
Veals (cwt.)	8.00	Alfalfa seed (bu.)	12.00
Eggs (doz.)	.22	Flax seed (bu.)	2.00
Poultry (lbs.)	.18	Timothy seed (bu.)	4.00
Hogs (lbs.)	.085	Clover seed (bu.)	16.00
Corn (bu.)	.70	Sweet clover seed (bu.)	16.00
Kafir (bu.)	.70	Seed oats (bu.)	.60
Oats (bu.)	.45	Twine (lb.)	.15
Bran (cwt.)	1.40	Limestone crushed (ton)	1.25
Shorts (cwt.)	1.70	Acid phosphate (ton)	15.00
Cottonseed meal (cwt.)	2.25	2-18-0 (ton)	40.00
Tankage (cwt.)	3.75		

Suggested Systems for 160-Acre Farm

The farm organization suggested for a 160-acre farm differs from the organization of the typical farm in having a smaller acreage of grain crops, a larger acreage in legume crops for hay and pasture, and a larger number of cows and poultry. This farm would require more labor than the typical farm for this section but the labor is more regularly distributed because less labor is required during the crop season. The system suggested is a family unit and could be handled by the operator and family labor with hired labor during the crop and haying season. All feed produced would be needed for livestock. It would be necessary to purchase some supplementary feed. Table XIV shows the production and use of the different crops. It is assumed that wherever practicable alfalfa will be rotated over all the fields. The acreage given for crops and pasture represents the proportion most likely to exist on farms of this size. Sweet clover would be used for pasture. Alfalfa would be plowed up and the field planted to a grain crop after standing four years.

The silo is to be filled with kafir or feterita and the corn saved for grain. The grain sorghums produce higher yields of silage than corn. Oats, used as a nurse crop for sweet clover and alfalfa, is seeded thinly and the estimated

Table XIV. — Crop production and use of crops on suggested organization for 160-acre farm, Bourbon county, Kansas.

Crop	Acres	Yield	Total production	Use of crop		
				Amount fed	Amount seeded	Available for sale
Corn	25	25 bu.	625 bu.	618 bu.	4 bu.	3 bu.
Kafir grain	4	30 "	120 "	118 "	2 "	-
Kafir silage	11	6.5 T.	71½ T.	70 T.	-	-
Oats	20	25 bu.	500 bu.	460 bu.	40 "	-
Oat straw	-	.4 T.	8 T.	2.5 T.	-	-
Alfalfa	20	2.5 "	50 T.	37.5 T.	-	12.5 T.
Prairie hay	10	1.0 "	10 T.	10.0 T.	-	-
Sweet clover	10	-	Pasture	-	-	-

yield is low. It is not planned to use the sweet clover in the rotation because of the disadvantage of having to do too much fencing to pasture the crop. Even if fences are available on the farm, the field is often inaccessible to the barns or does not have a water supply that will permit pasturing.

The distribution of feed to livestock is shown in Table XV with the quantity of feed for each class of livestock determined from the standard requirements. Feed for dairy cows is based on a production of 250 pounds of butterfat per cow and a pasture season of 160 days. Four horses should supply ample power for field work. A charge for replacing horses is included in farm expenses instead of making a feed allowance for young horses or colts.

Feed for other cattle includes the requirements for one bull, five heifers, five yearlings, six calves to be retained in the herd, and six calves for veal. This is enough stock to maintain a herd of 15 milk cows. The feed allowance for pork production assumes that the pigs have access to pasture. The feed allowance for poultry is for hens producing 100 eggs and five pounds of meat each per year.

Table XVI shows the livestock production, the use of the products, and the value of the sales from livestock. Under this system nearly 60 per cent of the income would come from the sale of whole milk. It is a common practice

Table XV. — Feed used by livestock, suggested organization for 160-acre farm, Bourbon county, Kansas.

Feed	Milk cows 15 head	Other cattle 10.5 animal units	Poultry 200 hens	Hogs 2,750 lbs. pork	Horses 4 head	Total
Corn and cob meal (lbs.)	12,750	5,250	--	--	--	18,000
Corn (lbs.)	--	--	5,200	11,000	4,000	20,200
Silage (tons)	49	21	--	--	--	70
Kafir (lbs.)	--	--	6,600	--	--	6,600
Oats (lbs.)	4,500	--	2,200	--	8,000	14,700
Oat straw (tons)	--	2.5	--	--	--	2.5
Alfalfa (tons)	24.5	12	--	--	1	37.5
Prairie hay (tons)	--	1	--	--	9	10.0
Bran (lbs.)	4,500	--	2,000	--	--	6,500
Middlings (lbs.)	--	--	--	687	--	687
Cottonseed meal (lbs.)	3,750	1,050	--	--	--	4,800
Tankage (lbs.)	--	--	1,000	412	--	1,412
Whole milk (lbs.)	--	4,725	--	--	--	4,725
Skimmilk (lbs.)	--	6,562	2,000	--	--	8,562

to separate a part of the milk to obtain skimmilk for feeding calves and chickens. Hence some cream is sold. The increase in dairy cattle and a small surplus of alfalfa will provide some additional income. Male calves are to be vealed. Poultry and pork are important sources of income.

The principal items of expense as shown by Table XVII are for purchased feed, livestock expense such as cow-testing fees, veterinary and medicine, and milk hauling; and crop expense which includes twine, grass seed, lime, phosphate, and threshing.

A comparison of the suggested system with a typical system of 160 acres is shown in Table XVII. The same requirements and standards of production are used for each farm to show the effect of the combination of enterprises. The suggested system has a larger acreage of legumes and a smaller acreage of cultivated crops than the typical farm. It also carries more cows and poultry and produces less pork than the typical.

A greater portion of the income on the typical farm comes from crop sales. Practically all crops in the suggested system are used to maintain the livestock.

Feed, livestock, and crop expenses are somewhat higher under the suggested system on account of more livestock being kept, and more frequent seeding of legumes with applications of lime and fertilizer. It also requires a

Table XVI. — Livestock production and use of product suggested 160-acre farm,
Bourbon county, Kansas.

Livestock	No.	Total pro- duction	Use of product				
			Used on farm	Used in home	Sold		
					Quantity	Price	Value
Cows	15	3,750 lbs. B'fat.	190 lbs.	170 lbs.	784.21 lbs	@ 2.0425 cwt.	\$1,601.75
					3.8% milk		
					410 lbs. B'fat.	@ .38 lb.	155.80
					4 cows, 1,100 lbs.	@ .05 lb.	220.00
					2 heifers	@ \$40.00	80.00
					6 veal calves	@ \$16.00	96.00
Hens	200	1,700 doz. eggs	100 doz.	200 doz.	1,400 doz.	@ .20 doz.	280.00
		1,000 lbs. meat	--	120 lbs.	880 lbs.	@ .18 lb.	158.40
Sows	2	2,750 lbs. meat	--	400 lbs.	2,350 lbs.	@ .085 lb.	199.75

a greater expense for hired labor.

With the same production and prices used in computing returns to each system, the suggested system shows a return for management and labor of the farm operator and his family of \$1,101 compared to \$464 on the typical farm.

Under actual farming conditions the suggested system would probably have even a greater advantage than is indicated. Crop yields in the long run would be higher on this farm than on the typical farm because of the rotation with legumes and manure from a greater number of livestock. The livestock production would be easier to obtain under the conditions suggested. The livestock production is figured the same in the typical system as in the suggested system for comparison only. However, it is doubtful if a production of 250 pounds of butterfat per cow could be obtained without silage or legume hay. It is also questionable if many farmers would erect and fill a silo for a herd of six dairy cows.

It is believed that many farmers could realize greater profits by adopting a system similar to the one suggested.

The labor distribution on the suggested and typical systems is shown in Figure 12. The suggested system requires the time of a hired man during the summer months in addition to the labor of the farm operator and his family. The typical system requires 1,000 hours less labor than the suggested system and requires but little hired labor.

Table XVII. — Comparison of suggested system with a typical system for 160-acre farms.

	Suggested system	Typical system
Crops raised:		
Corn	25 acres	40 acres
Kafir for silage	11 "	5 "
Kafir for grain	4 "	5 "
Oats	20 "	20 "
Alfalfa	20 "	-
Clover and timothy	-	15 "
Prairie hay	10 "	15 "
Sweet clover pasture	10 "	-
Native pasture	50 "	45 "
Other hay	-	5 "
Waste land	10 "	10 "
Crop production:		
Corn	625 bu.	1,000 bu.
Kafir silage	71.5 T.	32.5 T.
Kafir grain	120 bu.	150 bu.
Oats	500 "	500 "
Alfalfa	50 T.	-
Clover and timothy	-	18.75 T.
Prairie hay	-	15.00 T.
Other hay	-	10.00 T.

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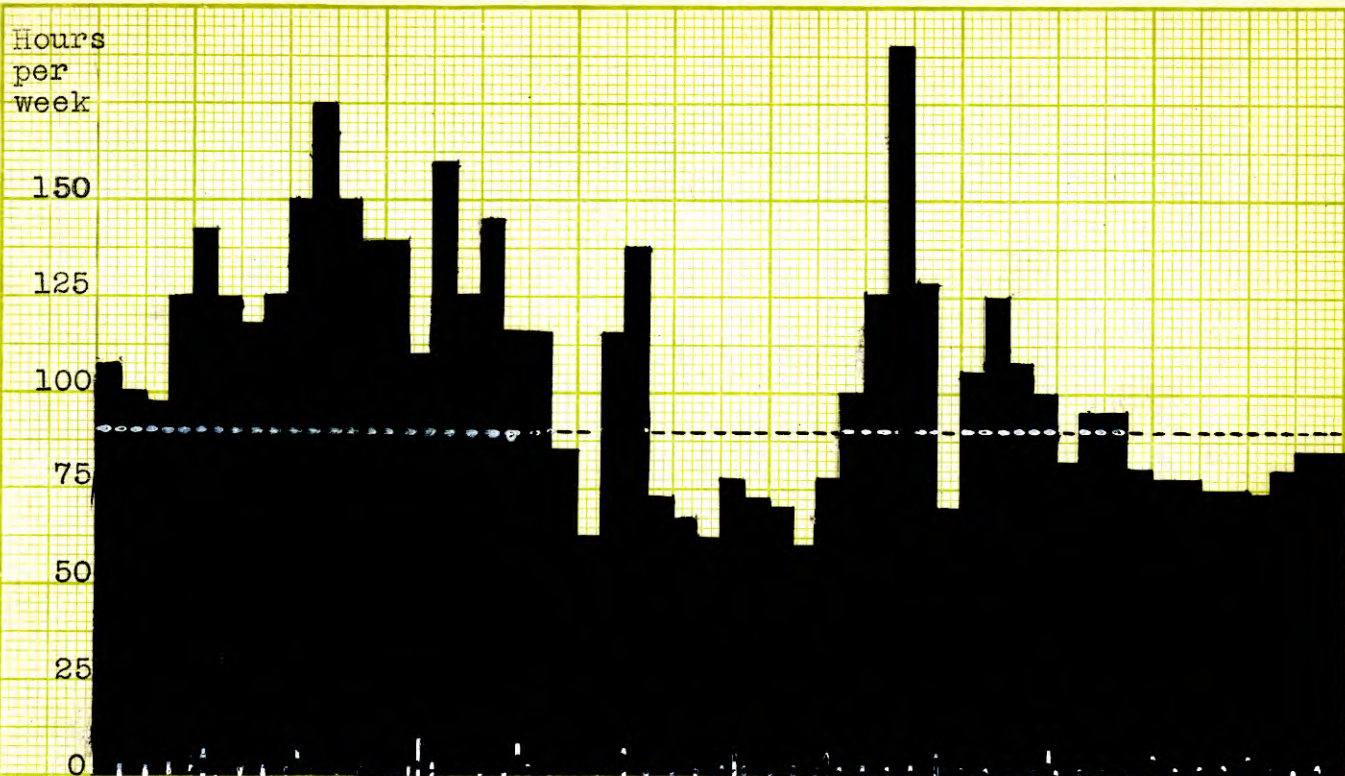
Table XVII. (con't.)

	Suggested system		Typical system	
Livestock kept:				
Cows	15 head		6 head	
Other cattle	10.5 "		6 "	
Poultry	200 "		75 "	
Brood sows	2 "		4 "	
Horses	4 "		5 "	
Livestock production:				
	3,750 lbs. B'fat.		1,500 lbs. B'fat.	
	13 calves		5 calves	
	1,700 doz. eggs		625 doz. eggs	
	1,000 lbs. poultry		375 lbs. poultry	
	2,750 " pork		4,500 " pork	
Crop sales:				
Corn	-	-	463 bu.	\$324
Kafir	-	-	113 "	79
Alfalfa	12.5 T.	\$188	-	-
Prairie hay	-	-	13	104
Livestock products:				
Milk	78,421 lbs.	\$1,602	26,800 lbs.	\$548
Butterfat	410 "	156	228 "	87
Veals	6	96	2	32
Cows and heifers	6	300	3	150
Eggs	1,400 doz.	280	387 doz.	78
Poultry	880 lbs.	158	375 lbs.	68
Pork	2,350 "	200	4,100 "	348
Total		\$2,980		\$1,818
Products used in home		260		260
Total income		\$3,240		\$2,078

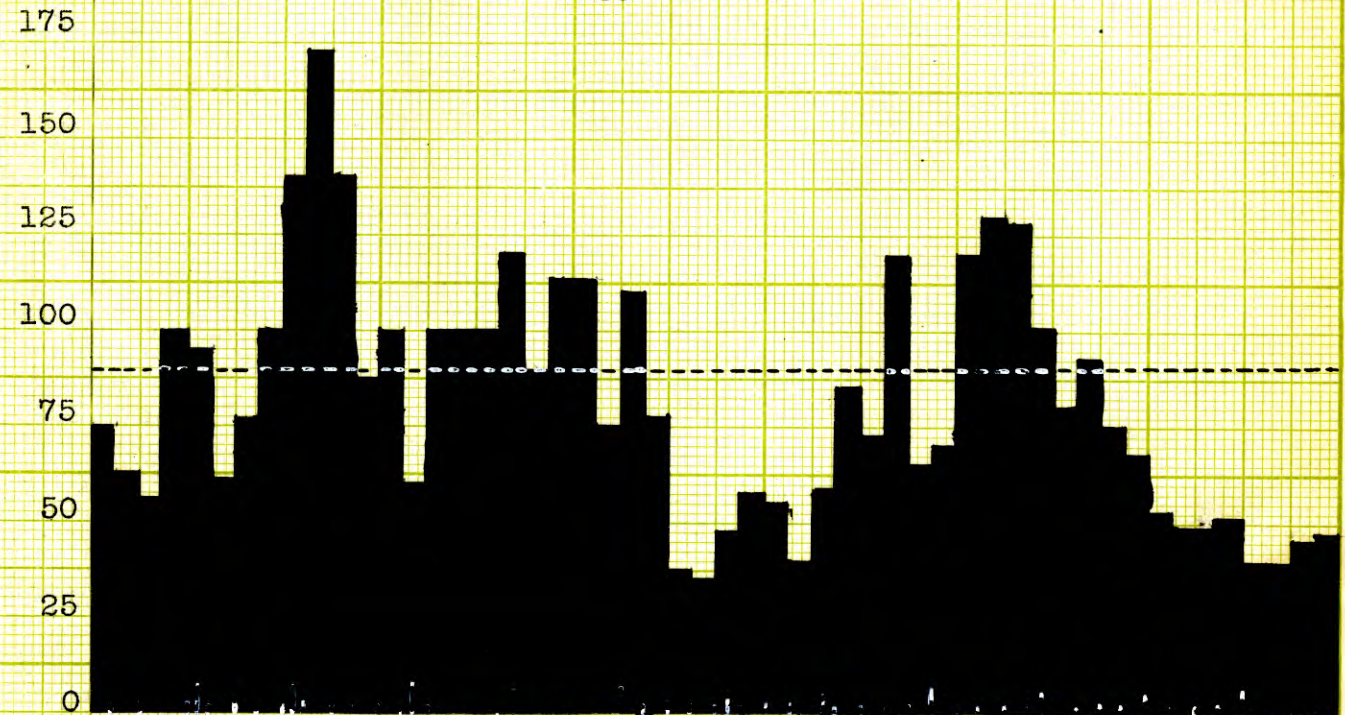
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Table XVII. (con't.)

	Suggested system		Typical system
Cash expense			
Purchased feed	\$269		\$139
Livestock expense	329		188
Crop expense	157		119
Machinery	235		247
Farm upkeep	258		235
Taxes	176		156
Hired labor	175		50
Total	\$1,599		\$1,134
Interest, \$13,500 @ 4%	540	\$12,000 @ 4%	480
Total deductions	\$2,139		\$1,614
Family earnings	\$1,101		\$464
Total hours labor	5,483		4,239
Labor force required	One man and family. Some hired labor.		One man and family. A little hired labor.



Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb.
 Fig. 12— Distribution of man labor by weeks on 160-acre farm with suggested system.



Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb.
 Fig. 12— Distribution of man labor by weeks on 160-acre farm with typical system.

Low yields of wheat and corn together with small farms and rough land prevent farms in this section from growing grain profitably. Only the larger farms can carry enough stock cattle to make a family-size business. There is little question but that dairying provides the most profitable system of farming under present conditions for the farm of usual size. The market for whole milk enables the average dairyman to obtain a higher price for his product than if it were sold as cream and the skim milk kept on the farm.

Estimated returns for a 160-acre farm selling cream, pork, and poultry products have been worked out. The standards for crop and livestock previously given were used. The acreage in the farm was divided as follows: Native pasture 50 acres, prairie hay 10 acres, alfalfa for hay and hog pasture 14 acres, corn and kafir 57 acres, oats 19 acres and waste land 10 acres. The livestock was assumed to be as follows: Six cows, young stock to maintain the herd, 200 hens, and hogs to produce 14,300 pounds of pork.

After figuring all receipts and making deductions for expenses and interest on investment as was done on the suggested and typical farm, family earnings were \$898. The family earnings on the suggested dairy system were \$1,135. This return is computed from normal prices of \$2.15 a hundred pounds for milk, 38 cents a pound for butterfat and

\$8.50 per hundred pounds for pork. On the same basis, hogs would have to sell for \$10.50 per hundred before this farm return would equal that of the suggested dairy farm. A drop in the price of milk would of course have a corresponding effect on the relative profits of the two systems.

Suggested System for an 80-Acre Farm

Table XVIII shows the comparison between the suggested system for an 80-acre farm and a typical system as operated at the present time. The cropping system has a larger acreage of legumes and a smaller acreage of grain crops than is commonly grown on typical 80-acre farms. Sweet clover is to be used to supplement the native pasture and should be used in the rotation wherever practicable. Alfalfa is recommended for hay and should also be included in the rotation. The 20 acres of native pasture and the 10 acres of sweet clover should be sufficient for a herd of 10 cows and young stock to replace the herd. Three horses could do the field work. A flock of 200 chickens is suggested as a minor enterprise and to utilize waste. No hogs are included because the poultry and cows require all of the grain produced.

The return to the farm operator and family after deducting farm expenses and interest on investment is \$661 as compared to \$255 on the typical farm. More labor is re-

Table XVIII. - Comparison of suggested system with a typical system for 80-acre farms.

	Suggested system	Typical system
Crops raised:		
Corn	10 acres	25 acres
Kafir silage	6.5 "	-
Kafir grain	3.5 "	5 "
Oats	10 "	10 "
Clover and timothy	-	10 "
Alfalfa	10 "	- "
Prairie hay	5 "	5 "
Sweet clover	10 "	-
Native pasture	20 "	20 "
Waste land	5 "	5 "
Livestock kept:		
Cows	10 head	4 head
Other cattle	7 "	4 "
Poultry	200 "	75 "
Brood sows	-	1 "
Horses	3 "	3 "

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Table XVIII. (con't.)

	Suggested system		Typical system	
Crop sales:				
Corn	-	-	300 bu.	\$210
Kafir	-	-	113 "	79
Oats	-	-	60 "	27
Alfalpa hay	4 T.	\$50	-	-
Livestock sales:				
Milk	1,950 lbs.	\$1,048	-	-
Butterfat	213 "	81	762 lbs.	\$290
Veals	7	112	2	32
Cows and heifers	2	100	2	100
Eggs	1,400 doz.	280	-	85
Poultry	880 lbs.	158	-	46
Pork			1,100 "	94
Total		\$1,829		\$ 963
Products used in home		260		260
Total income		\$2,089		\$1,223

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Table XVIII. (con't.)

	Suggested system	Typical system
Expense:		
Purchased feed	\$237	\$84
Livestock expense	241	51
Crop expense	82	58
Machinery	129	128
Farm upkeep	258	235
Taxes	<u>118</u>	<u>101</u>
Total	\$1,065	\$657
Interest on investment	<u>363</u>	<u>311</u>
Total deductions	\$1,428	\$968
Family earnings	\$661	\$255
Total hours labor	3,528	2,724
Labor force required	One man and family	One man and family

quired for the suggested system and the operator would have little time for outside work. This is a factor to be considered as many farmers on small farms depend on some outside work for a part of their income.

Returns as estimated from the standards are low for the small farm and the income could be increased through greater production per unit. Crop yield on a farm stocked as heavily as is suggested would undoubtedly be larger than the average for the area.

Suggested System for a 320-Acre Farm

The pasture acreage is relatively larger on the 320 than on the 160 or 80-acre farms. The organization of this farm and the typical 320-acre farm is shown in Table XIX. The cropping system given for the 160-acre farm is used: (1) Corn or kafir, (2) corn, (3) oats, and (4) alfalfa or sweet clover with one-half the alfalfa seeded every second year. The alfalfa is allowed to stand four years before being plowed up.

Livestock to consume the farm grown feed and utilize the pasture are kept. Practically all of the income comes from livestock, the crops being consumed on the farm. Under the suggested system the labor of two men would be required for the entire year with some additional labor in crop season. The return to the suggested system after deducting

Table XIX. -- Comparison of suggested system with a typical system for 320-acre farms.

	Suggested system	Typical system
Crops raised:		
Corn	40 acres	50 acres
Kafir silage	18 "	10.5 "
Kafir grain	6 "	4.5 "
Oats	32 "	25 "
Clover and timothy	-	25 "
Alfalfa	32 "	5 "
Prairie hay	21 "	40 "
Other hay	-	5 "
Sweet clover	16 "	-
Native pasture	140 "	140 "
Waste	15 "	15 "
Livestock kept:		
Cows	25 head	8 head
Other cattle	17 L.U.	20 L.U.
Poultry	250 head	70 head
Brood sows	3 "	3 "
Horses	7 "	8 "

Con't. on next page

Table XIX. (con't.)

	Suggested system		Typical system	
Crop sales:				
Corn	-	-	453 bu.	\$317
Kafir	-	-	97 "	68
Timothy and clover	-	-	11.2 T.	124
Prairie hay	-	-	22 "	176
Alfalfa	19.5 T.	\$292	-	-
Livestock products:				
Milk	5,125 lbs.	\$2,755	1,353 lbs.	\$727
Butterfat	665 "	253	445 "	168
Veals	11	176	-	-
Cows or heifers	9	410	11,000 "	715
Eggs	1,800 doz.	360	360 doz.	72
Poultry	1,130 lbs.	203	230 lbs.	41
Pork	4,400 "	374	4,600 "	391
Total		\$4,823		\$2,799
Products used in home		260		260
Total income		\$5,083		\$3,059

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Table XIX. (con't.)

	Suggested system	Typical system
Expenses:		
Purchased feed	\$240	\$203
Livestock expense	502	274
Crop expense	267	196
Machinery	388	388
Farm Upkeep	296	292
Taxes	291	260
Hired labor	<u>740</u>	<u>300</u>
Total	\$2,724	\$1,913
Interest on investment	<u>895</u>	<u>800</u>
Total deductions	\$3,619	\$2,713
Family earnings	\$1,464	\$346
Total hours labor	8,802	5,973
Labor force required	Two men with some family labor	Two men

expenses and interest is \$1,464 as compared to \$346 under the typical way of handling such a farm.

Putting the Suggested Systems into Operation

The systems suggested for the farms of different sizes have been given as if they were already in operation. It is recognized that changes in farm layout, methods and capital investment may be necessary on many farms before a similar plan could be used. The more important changes in converting a typical system to the one suggested are: (1) Fitting the land for legumes and (2) obtaining good cows.

Much of the land in this section must be treated with lime, acid phosphate and manure to grow alfalfa successfully. To get a good rotation in operation would require time and expense.

Most farmers do not have as high producing cows as those in the suggested systems. It would probably be advisable for them to build up a herd through the use of good sires instead of attempting to purchase a herd of high producing cows. Changing from the typical system to the suggested system would in many cases require added investment for a dairy barn, a silo or other facilities. Allowance has been made for these expenditures in comparing the two systems. No suggested system was included for 200-acre farms because they so closely approximate the 160-acre farms

in organization, the only difference being in acres in hay and pasture land.

The systems suggested will provide a basis on which individual farms may be organized for the greatest possible returns.

SUMMARY AND CONCLUSIONS

Yields of grain crops in Bourbon county have been declining since 1890, indicating a decreasing fertility of the soil. The acreage in leguminous crops is small. The acreage of alfalfa increased up to 1915 but has been declining since that date. Most of the tilled soil is acid and must be limed before legumes can be grown successfully. A large percentage of the land is unsuited for anything excepting pasture.

Numbers of livestock have fluctuated with their prices. Milk cows were unimportant during the early history of the county, but the trend in numbers has been upward since 1911.

The condensery at Fort Scott furnishes a good whole-milk market. The market for butterfat is as good as in other localities in that section of the state. There is a limited market for whole milk and sweet cream for city trade and ice-cream making.

Dairying, when properly conducted, has proven profitable on farms of this county in recent years.

The present system as practiced on typical farms of the county is inadequate because: (1) it does not have a large enough acreage of leguminous crops to maintain the soil fertility; (2) the farms are too small to make the handling of general livestock profitable; (3) on account of the low fertility of the soil, yields of grain crops are too low to make grain farming profitable; (4) as conducted at present farming pays a low rate of return to the farm operator and his family.

The farm program suggested for farms of the most usual sizes provides for: (1) an increase in the acreage of legume crops by the use of lime and fertilizer; (2) maintenance and building up of the soil by the use of legumes in the cropping system and by the use of livestock; (3) a well-balanced ration for dairy cows and other livestock made up largely of home-grown feeds such as legumes, pasture and silage; (4) profitable employment for the farm operator and his family throughout the year; (5) a more profitable farm system than is in use on typical farms at the present time.

BIBLIOGRAPHY

Biennial Reports of the Kansas State Board of Agriculture, 1875-1926.

Bonnen, C. A. and Hutson, J. B. Profitable Farming Systems for East Central South Dakota, Bulletin 226. South Dakota State College of Agriculture and Mechanic Arts and United States Department of Agriculture.

Climatological Data, United States Department of Agriculture, Weather Bureau, 1915 to 1926.

Englund, Eric. The Trend of Real Estate Taxation in Kansas, 1910 to 1923.

Forster, G. W. and Saville, R. J. Profitable Farm Combinations, Bulletin 252. North Carolina State College of Agriculture and Engineering.

Grandfield, C. O. Annual Report of County Agent, Bourbon county, 1925 and 1926.

Grimes, W. E., Hodges, J. A., Nichols, R. D., and Tapp, J. W. A Study of Farm Organization in Central Kansas, Bulletin No. 1296. United States Department of Agriculture and Kansas State Agricultural College.

Grimes, W. E., Hodges, J. A., and Nichols, R. D. Annual Reports, Bourbon County Cost of Production Data, 1925 and 1926.

Prices of Farm Products Received by Producers, Statistical Bulletin No. 15. United States Department of Agriculture.

The Agricultural Outlook for 1928, Miscellaneous Publication No. 19. United States Department of Agriculture.

Reports of county assessors, Bourbon county, 1926.

United States Census of Agriculture, 1925.

United States Census, 1860-1920.