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Profitable Farming Systems for the Intensive Spring Wheat Area in South Dakota

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South Dakota

Farm Economics Department
Agricultural Experiment Station
South Dakota State College of
Agriculture and Mechanic Arts
Brookings
co-operating with the
Bureau of Agricultural Economics
United States Department of Agriculture

Digest

Trend of Production—Although wheat will probably continue to be the most important single crop in the area studied, the trend of production is toward an increasing acreage of feed grains and legumes, the latter to provide for more live stock and a better balanced farming system.

Better Crop and Livestock Practices—Better balanced cropping systems, the use of adapted varieties of seed, and better practices in producing live stock are the most needed improvements on farms in the area studied.

Farming Systems—Systems of farming which are most likely to prove profitable in this area during the years just ahead are outlined in this bulletin. These are suggested with a view toward helping farmers in selecting systems of farming best suited to the conditions in the area.

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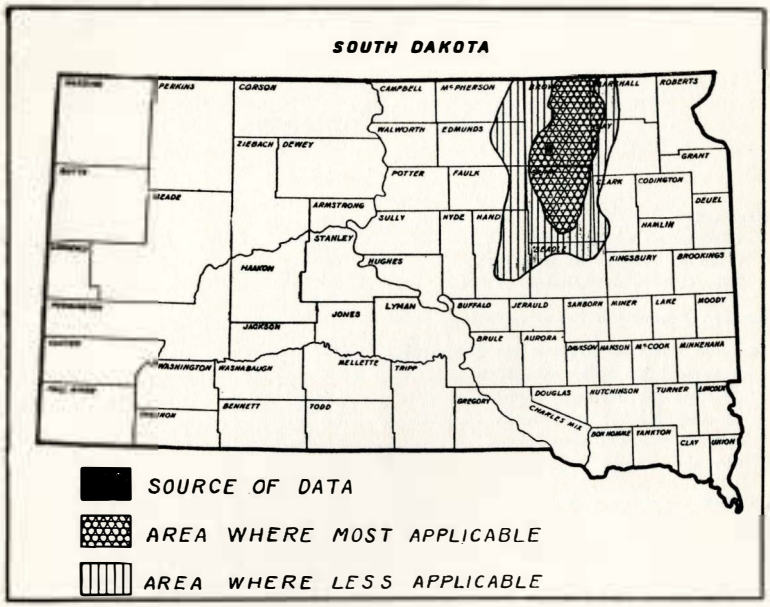

Fig. 1.—LOCATION OF THE AREA STUDIED.
Spring wheat is the most important single crop in this area which is largely located in an old, pre-glacier lake-bed.

Profitable Farming Systems for the Intensive Spring Wheat Area in South Dakota

C. A. Bonnen and R. H. Rogers*

The plan of the Department of Farm Economics of South Dakota State College is to study in detail the organization and operation of farms in each of the principal type-of-farming areas in the State. The object of these studies is to determine the systems of farming likely to give good results in an area over a period of years, including enterprise combinations which appear advantageous; practices giving good results in the principal enterprises; and adjustments between and within the enterprises likely to be desirable with changing conditions.

Two such studies have been completed and a third one is now in progress in the intensive corn and hog section of Southeastern South Dakota. The first of these studies was made in Kingsbury County and the results were reported in Bulletin 226, "Profitable Farming Systems for East-Central South Dakota."

The second study was made in Brown County in the intensive spring wheat area and some of the results are presented in this bulletin. The material in this publication is planned for the use of farmers within the area studied who may wish to make adjustments in their present farming systems; for new farmers who are planning to start farming within the area where this information is applicable; for the use of students in farm management courses; and for others who may be seeking information pertaining to farm management in the spring wheat area of this State.

Twenty farms were studied in detail in Brown County during the years 1925 and 1926. The Route Method of obtaining data was used; that is, the farms were visited at regular intervals and the farmers were assisted in keeping a careful and complete record of all farm operations.

Data showing the man labor, horse work and materials used in growing crops, and the feed, man labor, horse work and materials used in producing live stock and live stock products were obtained. A record of all financial transactions was also secured. The Bureau of Agricultural Economics of the United States Department of Agriculture co-operated with the department of Farm Economics of the South Dakota Agricultural Experiment Station in making this study.

Description of the Area

The farms studied are in the north-central part of the eastern half of South Dakota, just south and east of Aberdeen in Brown county. The results obtained are applicable to a great majority of the farms in the heavily shaded area indicated in Figure 1. This area comprises the level portions of the northern James river valley, which covers most of Brown and Spink counties and parts of Day, and Marshall counties. This area is called the intensive spring wheat area of South Dakota. Wheat, corn, oats, and barley are the principal crops grown while pork and dairy products are the principal sources of income from live stock.

*Acknowledgment is due to the farmers in Brown County who co-operated in supplying the data upon which this study is based; to Mr. C. G. Worsham, Mr. C. H. Krahler, and Mr. Paul Christophersen, who assisted in the collection and tabulation of the data; and to Professor M. R. Benedict, Head of the Farm Economics Department of South Dakota State College, for valuable criticisms and suggestions in planning this bulletin.

A rich, dark brown silt loam of the Bearden series predominates in the area. The topography is mostly level. Drainage is largely by natural streams, which flow into the James river. During seasons of heavy rainfall crops are sometimes damaged in places by excess water which does not drain off rapidly enough. About 90 per cent of the land in farms is improved.

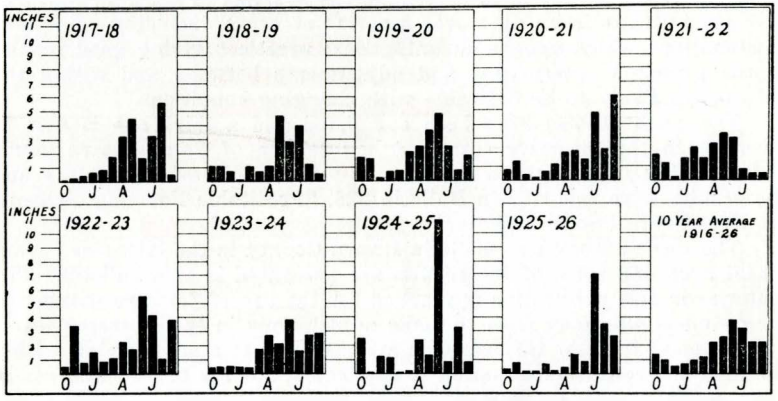

Fig. 2.—RAINFALL BY MONTHS AT ABERDEEN, S. D., 1917-1926. Approximately 75 per cent of the average annual rainfall comes during the six growing months, April 1 to September 30.

The monthly rainfall distribution at Aberdeen for each of the eight crop years from 1919 to 1926 is shown in Figure 2. The average monthly distribution for the ten crop years, 1917 to 1926, is also shown. Approximately 75 per cent of the average annual rainfall of 22.1 inches comes during the six growing months, April 1 to September 30, and between 40 and 50 per cent during May, June, and July. June is normally the month of heaviest rainfall. During the ten-year period, 1917-1926, the heaviest precipitation occurred five times in June, twice in May, and once each in July, August, and September. Both the amount and the distribution of the rainfall vary greatly from year to year.

Table I.--SOME PHYSICAL CHANGES IN BROWN COUNTY, 1880-1925.

Year	Number of Farms	Land in Farms	Average Acreage	Average Crop Acreage	Value Land and Bldgs.	Population
		Acres	Per Farm	Per Farm	Per Acre	
1880	28	4,160	149	7	7	353
1890	2,527	694,685	275	189	11	16,855
1900	1,921	905,157	472	272	8	15,286
1910	2,115	973,595	461	327	53	25,867
1920	2,305	1,018,000	442	321	85	29,509
1925	2,262	940,600	416	312	58	30,533

Data from United States Census.

During 1925, 26.8 inches of rain were reported at Aberdeen but 10.9 inches fell during the month of June, while drought conditions prevailed during May and July. During the crop year of 1926, a severe shortage of rain combined with a poor distribution, was the cause of the worst crop failure in the history of the area. Of the total rainfall of 16.5 inches during this year, over ten inches fell during July and August. As a result, all small grains were practically a total failure, while corn devel-

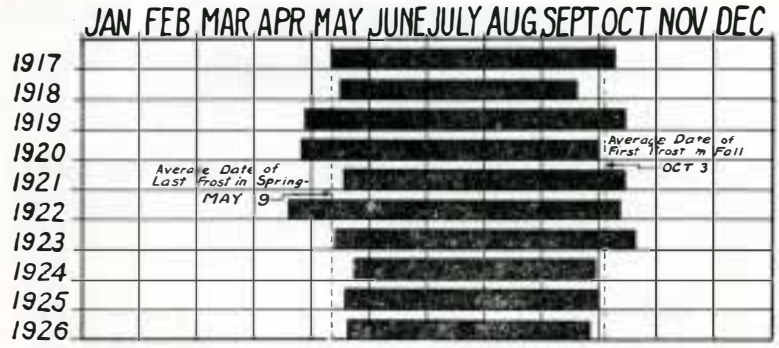

Fig. 3.—LENGTH OF GROWING SEASON, 1917-1926.
During the ten-year period studied, the number of frost-free days would permit the maturing of adapted varieties of corn.

oped slowly and very little of it matured. Because of this unusual season, much of the data collected was unsuitable for general use in a farm organization study, therefore most of the detailed information on which this bulletin is based has been taken from the records of the 1925 study.

During the ten-year period, 1917 to 1926, the number of frost-free days varied from 127 in 1924 to 172 days in 1922. The average for the period was 147 days (See Figure 3).

Changes in Farming and Trends of Production in the Area

There was very little farming carried on in Brown county and the adjoining counties previous to 1880. After this time, however, settlement was rapid and by 1890 over two-thirds of the land now in farms had been taken up (See Table I). This rapid development was due to the coming of the railroads into the county. By 1900 practically all land now in farms had been taken up and development since that time has been chiefly in the amount of improved land in farms. Although the population of the county has doubled since 1900, farm population has increased but very little. Most of the increase in population has been in Aberdeen, a town now of more than 15,000 people.

Changes in the Acreage of the Principal Crops.—Changes in the acreage of the principal crops grown in Brown county since 1890 are shown in Table II and Figure 4. From the beginning of farming in the county until some time after 1900, one-crop farming prevailed. Wheat occupied about 80 per cent of the acreage devoted to grain. During the same period feed grains, corn, oats, and barley were grown to a very limited extent, occupying only 15 per cent of the acreage devoted to grain.

From 1900 to 1925, wheat decreased from 82 per cent of the grain acreage to 42 per cent while the feed grains increased from 15 per cent to 53 per cent of the grain acreage. Although the combined acreage of feed grains is greater than the wheat acreage at the present time, wheat is still the most important single crop grown in the area.

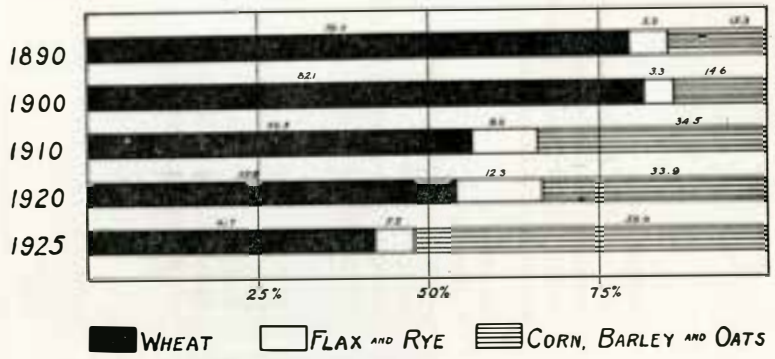

Fig. 4.—PERCENTAGE DISTRIBUTION OF THE GRAIN ACREAGE.
Wheat acreage in the area has gradually been reduced. Feed grains, for the most part, have been substituted for wheat.

Table II.—CHANGES IN ACREAGE AND CROPS, BROWN COUNTY, 1890-1925.

Year	Wheat		Flax and Rye		Corn		Barley		Oats		Total feed grains Corn, Oats, Barley	
	Acres per Farm	Per Cent	Acres per Farm	Per Cent	Acres per Farm	Per Cent	Acres per Farm	Per Cent	Acres per Farm	Per Cent	Acres per Farm	Per Cent
1890	127	79.4	9	5.3	1	.8	7	4.3	16	10.2	24	15.3
1900	173	82.1	7	3.3	9	4.5	9	4.2	12	5.9	30	14.6
1910	149	56.5	24	9.0	17	6.3	49	18.5	25	9.7	91	34.5
1920	147	53.8	34	12.3	41	15.0	21	7.7	31	11.2	93	33.9
1925	114	41.7	14	5.3	72	26.5	27	9.8	46	16.7	145	53.0

Data from United States Census.

Changes in the Number of Livestock.—The trend of live stock production in Brown county is shown in Figure 5 and Table III. Cattle increased more rapidly than other live stock during the early development of the area. This was due, no doubt, to the large amount of unimproved hay and pasture land available at that time. As the cultivated area increased and wheat gave way to feed grains after 1900, cattle did not increase so rapidly while the hog enterprise kept pace with the increase in feed grains. With the exception of the few years before and after 1900, sheep have never been an important enterprise in the area.

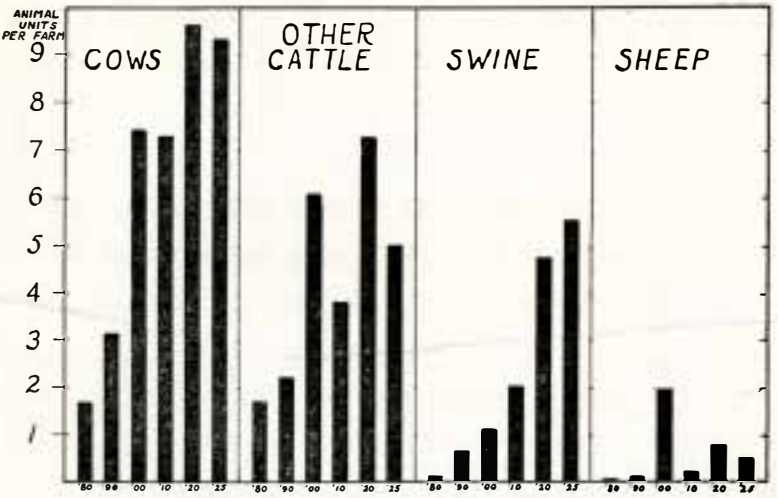

Fig. 5.—CHANGES IN LIVESTOCK, BROWN COUNTY, 1880-1925.
With feed grains replacing wheat, livestock have continued to increase in importance in the area.

Table III.—CHANGES IN LIVESTOCK, BROWN COUNTY, 1880-1925.

Year	Cows		Other Cattle		Swine		Sheep	
	Total	Per Farm	Total	Per Farm	Total	Per Farm	Total	Per Farm
1880	44	1.6	100	3.6	19	.7	5	.2
1890	7,736	3.1	11,836	4.7	9,935	3.9	2,298	.9
1900	13,995	7.4	24,287	12.6	11,796	6.1	30,017	15.6
1910	15,412	7.3	16,840	8.0	23,273	11.0	4,589	2.1
1920	22,139	9.6	34,615	15.0	60,005	26.0	14,192	6.2
1925	21,109	9.3	23,821	10.5	67,757	30.4	9,159	4.0

Data from United States Census.

Present Type of Farming

According to the 1925 Census, the average farm in Brown county in 1924 grew 114 acres of wheat, 72 acres of corn, 46 acres of oats, 27 acres of barley, and 14 acres of flax and rye.

The livestock system was made up of nine horses, 9.5 cows, 19.5 other cattle, ten brood sows and gilts, four sheep, and 90 chickens on the average.

The average percentage of the crop acreage of the various crops, and the number of the various classes of productive live stock for the most usual sized farms in the area are shown in Table IV. It will be seen that the combination of enterprises does not differ greatly from one size-group to another. In general the amount of cash crops grown is greater and live stock are relatively less important on the larger farms.

While there is little variation on the average in the amount of the different crops grown and in the numbers of livestock kept from one size-group to another, a more detailed study shows that there is consid-

Table IV.—CROP ACREAGE AND LIVESTOCK PER FARM

Size-Groups (Acres)	Number of Farms Included	Av. % of total farm in crops	Average percentage of crop acreage per farm							Average number per farm				
			Wheat	Corn	Oats	Barley-Spelz	Flax-Rye	Alfalfa Hay	Other Hay	Cows	Other Cattle	Brood Sows	Other Hogs	Lambs
160	86	81	43	22	11	13	3	1	7	4.3	2.9	5.7	11.4	6.0
320	176	83	49	23	11	9	2	1	5	6.1	6.1	9.8	22.8	2.1
480	117	85	52	21	9	8	3	1	6	7.2	8.6	11.2	25.7	3.1
640	45	85	50	20	9	9	5	1	6	9.6	12.6	13.8	36.5	11.0

Data obtained from 1925 United States Census reports for six townships in Brown and Spink counties, near the area covered in this study.

erable variation from farm to farm within these groups. This is well illustrated in Figure 6 which shows the variation in the proportion of wheat and corn grown on 177 farms of the same size in Brown and Spink counties. At one extreme are found farms having 80 per cent of their crop land in wheat with practically no corn, while at the other extreme are farms having a large acreage of corn and very little wheat. Thirty-eight per cent of these farms (or Group 1) had a greater acreage of wheat and a smaller acreage of corn than the average, while 32 per cent (or Group 4) had a smaller acreage of wheat and a greater acreage of corn than the average. The remaining 30 per cent of the farms were evenly divided between two groups, one having both more wheat and more corn than the average, (Group 2) and the other having both less wheat and less corn than the average (Group 3).

Wheat and corn were selected for this illustration because these two crops more nearly reflect the system of farming followed than do any other two enterprises. A large acreage of wheat as compared to other crops suggests the old system of one crop farming while a large corn acreage is usually accompanied by live stock and a well balanced system, or the system toward which the trend of production is moving.

A study of other size-groups and combinations of enterprises gave results similar to those shown in Figure 6. That is, there were wide variations in the amounts of the different crops and live stock from farm to farm within the same size-group.

The data given thus far suggests that farming is changing rapidly in the area and that farmers are experimenting with many different combinations of enterprises with no large group of farmers agreed as to the best combination for the area. It has been shown, however, that in general the trend has been away from wheat or one-crop farming, as illustrated by the farms in Group 1 of Figure 6, and toward a well balanced system including a large proportion of feed crops and live stock as illustrated by the farms in Group 4 of Figure 6.

It is believed that this trend will continue, and that as better adapted varieties of corn are developed for the area, corn, and other feed crops will become more important and live stock products, particularly pork, will make up a larger proportion of the farm income.

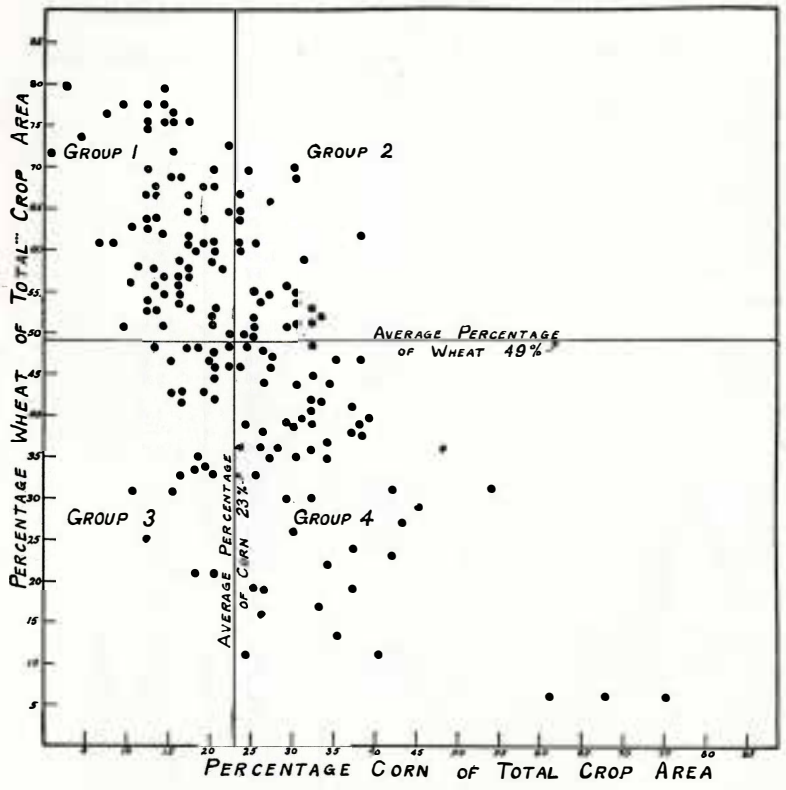

Fig. 6.—PERCENTAGE OF CROP AREA IN WHEAT AND CORN.
The frequency distribution of the percentage acreage of wheat and corn on 320 acre farms in Brown County, 1924, is shown in the above Figure. Each dot represents a farm with a certain percentage of the crop area in wheat and corn.

This opinion is based on the following facts:

1. Such changes are in line with the present trend of production.
2. The same changes have taken place in older areas adjoining the the present spring wheat area.
3. Because of long distances to market and high freight rates, this area is at a disadvantage with other surplus feed producing areas in marketing crops.
4. A large part of this disadvantage is offset when these crops are fed to live stock and sent to market in a more concentrated form such as pork, beef, butterfat, and other live stock products. A pound of pork brings to market from four to five pounds of grain; a pound of gain on a fat steer from seven to eight pounds of grain besides considerable roughage of different kinds; and a pound of butterfat, produced under ordinary farm conditions, markets from 40 to 60 pounds of feed which is principally hay and other roughage.

Table V.—STANDARD LABOR REQUIREMENTS PER ACRE FOR CROPS.

OPERATION	Size of Machine	Man Hours	Horse Hours	Timesover
SEED BED PREPARATION:				
Plowing	28 inch	2.00	10.00	--
Plowing	42 inch	1.25	10.00	--
Plowing	56 inch	1.00	11.00	--
Discing, Single	9 foot	.50	2.50	--
Discing, Tandem	10 foot	.40	3.20	--
Harrowing	26 foot	.20	.80	--
Packing	15 foot	.30	1.20	--
Cultivating	1 row	1.33	2.67	--
Cultivating	2 row	.67	2.67	--
WHEAT:				
Plowing	28 inch	2.00	10.00	1.0
Harrowing	26 foot	.40	1.60	2.0
Seeding	11 foot	.40	1.60	--
Cutting	8 foot	.60	2.40	--
Shocking		.60		--
Threshing		2.00	4.00	--
Total		6.00	19.60	--
FLAX:				
Plowing	28 inch	2.00	10.00	1.0
Discing	9 foot	.50	2.50	1.0
Harrowing	26 foot	.20	.80	1.0
Seeding	11 foot	.50	2.00	--
Cutting	8 foot	.60	2.40	--
Threshing		2.50	5.00	
Total		6.30	22.70	--
OATS, BARLEY, SPELTZ:				
Discing	9 foot	.50	2.50	1.0
Harrowing	26 foot	.20	1.20	1.0
Seeding	11 foot	.40	1.60	--
Cutting	8 foot	.60	2.40	--
Shocking		1.00		--
Threshing		3.00	6.00	--
Total		5.70	13.70	--
CORN:				
Plowing	28 inch	2.00	10.00	1.0
Discing	9 foot	.25	1.25	.5
Harrowing	26 foot	.50	2.00	2.5
Planting	2 row	.65	1.30	--
Cultivating	2 row	2.00	8.00	3.0
Cutting	1 row	1.50	4.50	--
Shocking		2.50		--
Husking, hand		5.00	10.00	--
Husking, machine	1 row	3.00	12.00	--
Total Cut Corn:				
Hand husked		9.40	27.05	--
Machine husked		10.40	32.55	--
Corn in field		8.40	34.55	--
HAY:		5.40	22.55	--
Mowing	5 foot	1.00	2.00	--
Raking	10 foot	.50	1.00	--
Stacking		3.00	4.50	--
Total		4.50	7.50	--

Labor Requirements for Threshing includes Bundle Haulers from Threshing Crew and Exchange Labor Received.

The freight rate on corn from Aberdeen to Chicago in 1926 was 30.5 cents per 100 pounds while the rate on hogs was 45.5 cents per 100

pounds for a double deck car. On the basis of these rates and average feed requirements for producing 100 pounds of pork, a reduction of 91 cents may be made in marketing costs for every 100 pounds of pork marketed in the place of grain. For such products as butterfat and wool, which have a high value per pound, the saving would be greater. In addition to the advantage of lower marketing costs, secured by selling feed grains in the form of live stock and livestock products, the feeding of grain and roughage on the farms where it is produced, permits a return of fertility to the soil in the form of manure.

Standard Production Requirements for the Area.

One of the principal aims of detailed farm management studies is to determine the production requirements of different enterprises and systems of farming. From such data, standard requirements may be set up and used as a basis for planning systems of farming which seem best suited to conditions found in the area and which are likely to prove profitable in the future.

The requirements of man labor and horse work for crop production used in planning the suggested systems of farming outlined in this bulletin are shown in Table V.

The yields used and the materials required for crop production are shown in Table VI.

The feed and labor requirements for the different classes of livestock are shown in Table VII while the feed requirements for cows of different production ability are shown in Table VIII.

Table VI.--STANDARD YIELDS AND MATERIAL REQUIREMENTS FOR CROP PRODUCTION.

CROPS	Yield per Acre	Seed per Acre	Twine per Acre	Custom Rig Threshing Cost per Bushel
Wheat	12 bu.	1.1 bu.	2.4 lbs.	$.15
Oats	30 bu.	2.2 bu.	3.0 lbs.	.08
Barley	24 bu.	1.6 bu.	3.0 lbs.	.10
Flax	9 bu.	.5 bu.		.25
Alfalfa Seed	1 bu.	15 lbs.		
Sweet Clover Seed	3 bu.	10 lbs.		
Corn, Ear	27 bu.	8 lbs.		
Potatoes	80 bu.	12.0 bu.		
Alfalfa Hay (2 cuttings)	2 T.			
Sweet Clover Hay	1 T.			
Wild Hay	1 T.			

These yields and production requirements are not the average of the farms studied, but represent the results obtained by the more successful farmers following similar systems of farming. In most cases these yields are slightly higher than the average yields for Brown county during the 14-year period, 1912 to 1925. In the case of labor, feed, and material requirements, the figures used are such that they may easily be attained on well managed farms.

The suggested systems outlined in this bulletin have been planned with a view of providing profitable employment for the available labor as regularly throughout the year as possible. The amounts of labor required and the distribution of the same has been carefully estimated to determine the amount of labor that would have to be hired at various times during the year. The labor requirements for crop and livestock

production as shown in Tables V and VII were used in determining the amount of labor needed. The usual dates of performing the various crop operations shown in Figure 7, were used in estimating this distribution. The labor requirements for livestock production are heaviest during the winter months when no field work can be done.

Table VII.—STANDARD FEED AND LABOR REQUIREMENTS FOR LIVESTOCK

LIVESTOCK	Grain	Protein Feeds	Tame Hay	Wild Hay	Silage	Other Roughage	Whole Milk	Skim-milk	Man Labor	Horse Work	Cash Costs
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Hrs.	Hrs.	Dols.
Work Horses, per head (800 work hrs.)	3,000	---	---	3,000	---	1,500	--	---	80	4.0	.50
Dairy Cows, per head (250 lbs. butterfat)	1,720	80	1,600	---	2,800	1,100	--	---	120	4.0	.70
Dairy Young Stock per head	400	---	1,600	---	2,400	1,000	80	600	20	2.0	.40
Milk Cows, per head (175 lbs. butterfat)	1,150	50	1,900	---	---	1,400	--	---	90	4.0	.50
Mixed Young Stock per head	650	---	1,000	---	---	500	80	600	20	2.0	.30
Steers on full feed per 100 lbs. gain	800	100	450	---	---	---	--	---	5	.5	.10
Swine, per 100 lbs. pork	450	20	---	---	---	---	--	150	2.5	.5	.20
Poultry, per 100 hens	5,250	250	---	---	---	---	--	500	230	--	.35

Table VIII.—STANDARD FEED AND LABOR REQUIREMENTS FOR MILK COWS.

Production (Butterfat)	No. Cows	Grain	Protein Feed	Tame Hay	Other Roughage	Silage*	Pasture	Man Labor	Horse Work	Cash Costs
Lbs.		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Days	Hrs.	Hrs.	Dols.
150	39	960	40	1,000	1,500	2,000	185	80	4	.50
175	47	1,150	50	1,150	1,400	2,200	182½	90	4	.50
200	77	1,340	60	1,300	1,300	2,400	180	100	4	.50
225	88	1,530	70	1,450	1,200	2,600	177½	110	4	.60
250	102	1,720	80	1,600	1,100	2,800	175	120	4	.70
275	74	1,910	90	1,750	1,000	3,000	172½	130	4	.80
300	56	2,100	100	1,900	900	3,200	170	140	4	.90
325	51	2,290	110	2,050	800	3,400	167½	150	4	1.00

Data from 534 Cow Testing Association Records from Hamlin, Codington and Day counties for period April, 1925, to April, 1926.

*On farms where no silage is available, 350 pounds of good quality legume hay may be substituted for 1,000 pounds of silage.

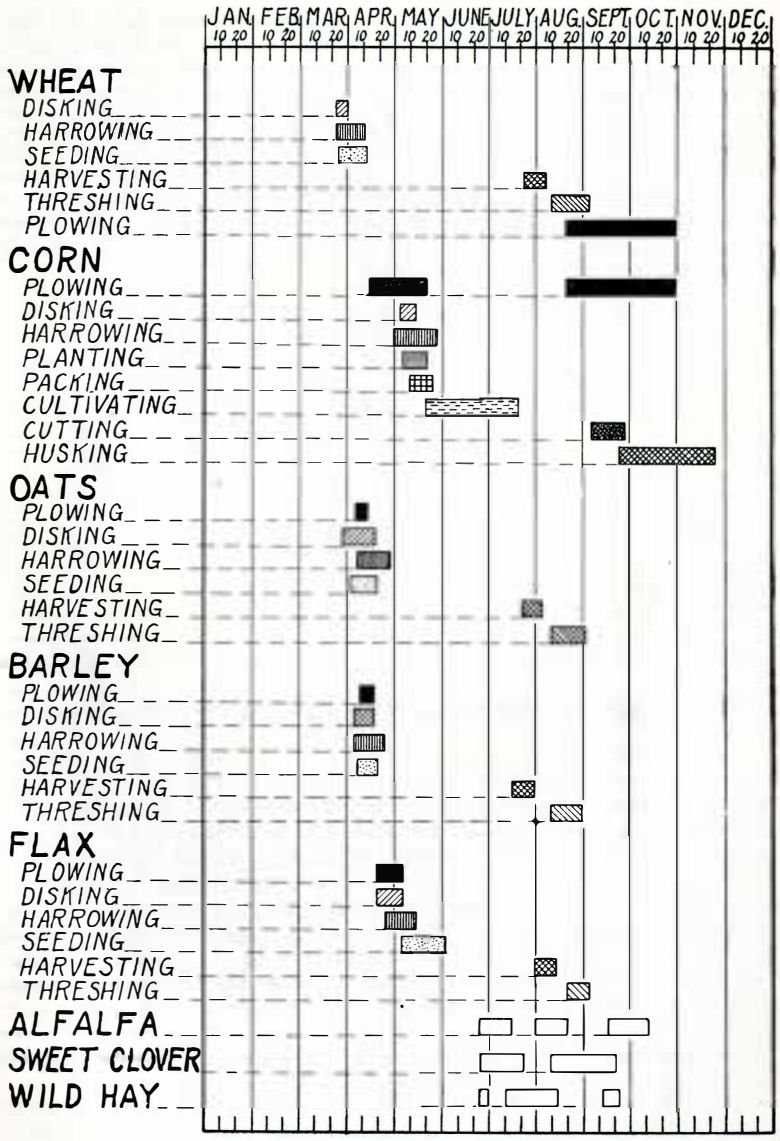

Fig. 7.—THE USUAL PERIOD FOR THE PERFORMANCE OF FIELD OPERATIONS ON CROPS.

A well-balanced cropping system, that includes cultivated crops, small grain and legumes, distributes labor and equipment use more evenly throughout the growing and harvesting season,

The prices used in estimating the probable returns from the various suggested farming systems are shown in Table IX. **These prices are not predicted prices for any particular year or group of years, but represent the price relationship which seems likely to prevail in the area over a period of years.** It is recognized that in any one year the prices of particular crops or livestock products may be higher or lower than those used. However, in planning a long-time farming system, farmers must consider the **probable price relationship** over a period of years. In each of the suggested systems the quantities sold are given, and the differences in returns which would result from changes in the usual price relationship can be easily determined.

Table IX.—PRICES FOR CROPS AND LIVESTOCK PRODUCTS.

CROPS	Relative Prices Over a Period of Years	LIVESTOCK	Relative Prices Over a Period of Years
Wheat	$ 1.10	Butterfat	$ .40
Oats	.30	Beef	.08
Barley	.50	Pork	.08
Flax	2.00	Eggs	.25
Corn, Ear	.55	Poultry	.15
Potatoes	.60	Wool	.30
Alfalfa Seed	.25	Mutton	.11
Silage	3.50	Cows (for beef)	.05
Alfalfa Hay	10.00		
Sweet Clover Seed	.06		
Wild Hay	7.00		
Bundle Corn*	8.00		

*Checked corn with approximately 40% of total weight in ear corn.

PROFITABLE FARMING SYSTEMS FOR THE AREA

In outlining these systems of farming, the probable future trends in the production of the various crop and livestock products have been taken into consideration. As has been pointed out previously, systems of farming in the area are changing from wheat or grain farming to well balanced farming systems based largely on feed crops and livestock.

Many farmers in the area have reduced the acreage of wheat and increased the acreage of feed crops, but have not increased livestock accordingly. As the corn crop is sometimes immature and unmarketable, and since feed crops can usually be marketed in the form of livestock products to better advantage in this area than as cash crops, these farmers have not realized the greatest benefit from such a change in their cropping system.

The organization and probable returns from a typical 320 acre grain farm in this area is given in Table X.

These figures show that relatively low returns may be expected by anyone following this system of farming. By comparing this system with the following suggested systems the difference between poorly balanced and well-balanced systems of farming may be seen.

The following suggested systems of farming are designed to show the direction in which the best information available indicates the development of farming in the area should take. It is realized that every farm has problems which are peculiar to itself and which make it neces-

sary to operate it a little differently from other farms. Thus farms differ in size and in the amount of land that can be cultivated. To produce a given return for the farm operator's labor and management, small farms must be operated much more intensively than large farms. For that reason small farms usually produce relatively more feed crops and livestock products than do large farms.

Farms vary with respect to distance to market. This affects the form in which products will be marketed. Ordinarily when the distance to market is great, the products offered for sale should have a high value per pound such as butterfat, pork, beef, etc., while farms near the market may sell more bulky and more perishable products.

The farmer who has limited capital, or who does not have sufficient credit standing, must ordinarily confine his efforts to farm enterprises which have low capital requirements and which give a quick return such as cash grain crops, poultry and hogs.

Table X.—ORGANIZATION OF A TYPICAL 320 ACRE GRAIN FARM.

Item	Acres	Production (Bushels or Tons		Income
CROPS:		Raised	Sold	(Dollars)
Wheat	106	1,272	1,145	1,260
Oats	39	1,170	334	100
Barley	33	792	373	187
Corn	65	1,755	727	400
Potatoes	2	160	136	82
Wild Hay	7	7	----	----
Pasture	66	----	----	----
Total Crops:				2,029
LIVESTOCK:	Number	Production		
Work horses	7			
Milk cows	6	1,000 lbs. B. F.		400
Other cattle	16	4,000 lbs. Beef		320
Brood Sows	4	5,000 lbs. Pork		400
Hens	140	Eggs and meat		245
Total Livestock:				1,365
TOTAL INCOME:				3,394
EXPENSES:				
Cash expenses				1,416
Interest and depreciation				1,548 2,964
OPERATOR'S LABOR AND MANAGEMENT WAGE*				430

*The operator's labor and management wage is arrived at by deducting from the total farm receipts, the cash expenses of the farm business, an allowance for any unpaid family labor, depreciation on the equipment and buildings, etc., and a charge of 5 per cent interest on the capital invested.

The kind and amount of available labor varies from farm to farm. The farmer who has several boys, and consequently a large amount of family labor to utilize, should ordinarily plan a somewhat different system of farming than the system used by the farmer who depends entirely upon hired labor. In the one case the system of farming must be made to fit the labor supply in order to properly utilize it, while in the other, the labor supply can be made to fit the system of farming.

Fig. 8.—A GOOD SET OF FARM BUILDINGS.
Livestock on a number of farms in this area are a relatively recent addition to the farm business. Adequate buildings and woven-wire fences are necessary for best results. Such buildings need not be expensive.

Farmers themselves vary in their ability to handle certain kinds of enterprises. This may be due to a personal dislike for certain kinds of work or it may be due to a lack of knowledge of the enterprise requirements, or both. The man who does not like to work with a certain class of live stock will usually get poor results with that particular enterprise. The "bad luck" that some farmers have in raising live stock can usually be traced to a lack of knowledge or to a lack of appreciation of the importance of certain practices which determine success or failure with livestock.

Because of these differences, in farms and farmers, which make it necessary to operate each farm a little differently than others, a few of the possible variations are mentioned for each suggested system of farming. These variations are given merely to illustrate how these systems may be adjusted to fit individual cases without changing the fundamentals of the original system.

Good Systems for 240 Acre Farms

The important details of an actual system and two suggested systems for 240 acre farms are shown in Table XI. The same prices, yields and production requirements used in planning the suggested systems are applied to system No. 1 to make it comparable to the others.

Table XI.—SUGGESTED SYSTEMS OF FARMING FOR 240 ACRE FARMS.*

ITEM	SYSTEM No. 1 An Actual Farm in Brown County				SYSTEM No. 2 Dairying and Hogs				SYSTEM No. 3 Hogs and Cattle			
		Production Bus. or Tons		Income		Production (Bus. or Tons)		Income		Production (Bus. or Tons)		Income
	Acres	Raised	Sold	(Dollars)	Acres	Raised	Sold	(Dollars)	Acres	Raised	Sold	Dollars
CROPS:												
Wheat	47	564	508	559	33	396	356	392				
Oats	45	1,350	---		33	990	---		38	1,140		
Barley	34	816	437	218	33	792			38	912	---	
Corn, husked and hogged	19	513	---		56	1,512	---		76	2,052	---	
Corn, cut for fodder	8	12	---									
Corn, cut for silage	10	50	---		10	50	---					
Potatoes	3	240	204	122	1	80	68	41	1	80	68	41
Sweet Clover	12	12	---		33	Pasture	---		38	Pasture	---	
Alfalfa	15	30	---		16	22	---		20	26	---	
Alfalfa	---	---	---			Hogpasture	---		---	Hogpasture	---	
Unimproved	37	pasture	---		16	8	---		20	9	---	
				899				433				— 41
LIVESTOCK:	Nos.	Production			Nos.	Production			Nos.	Production		
Work Horses	6				6				6			
Dairy Cows	16	4,000 lbs. B. F.		1,600	20	5,000 lbs. B. F.		2,000				
	---	2 cows		160	---	4 Cows		320	---			
Dairy Young Stock	20	5 Heifers		375	10	10 Head		600				
	---	7 Veal Calves		105								
Milk Cows									10	1,750 lbs. B. F.		700
										2 Cows		120
Other Cattle									30	10 Head		840
Brood Sows	4	5,000 lbs Pork		400	13	16,250 lbs. Pork		1,300	24	30,000 lbs. Pork		2400
Poultry	150	Eggs and meat		262 2,902	200	Eggs and meat		350 4,570	100	Eggs and meat		175 4235
TOTAL INCOME:				3,801				5,003				4,276
EXPENSES:	Investment	Dollars			Investment	Dollars			Investment	Dollars		
Improvements		338				369				333		
Upkeep		307				322				304		
Taxes and Insurance		260				280				271		
Seed, Twine and Threshing		364				295				268		
Veterinary and Medicine		33				59				82		
Feed and Handling Feed		167				216				411		
Labor		750				750				375		
Interest on Investment @ 5%	$21,652	1,083		3,302	$23,379	1,169		3,460	$22,556	1,128		3,172
OPERATOR'S LABOR AND MANAGEMENT WAGE				499				1,543				1,104
Labor Requirements:**												
Crops (man hours)		1,347				1,315				1,229		
Livestock (man hours)		3,270				3,809				3,022		
TOTAL		4,617				5,124				4,251		
Labor Force Required:	2 men, 12 months				2 men, 12 months				1 man, 12 months ; 1 man, 6 months			

*Standard Yields and Prices have been applied to all Systems. **In addition to crop and livestock labor requirements, the total "labor force required" includes an additional 10-20%, depending on the system followed, to care for the miscellaneous farm jobs.

SYSTEM NO. 1. (240 acre farms).

This is a system used on an actual farm located four miles from a town of 15,000 people. The labor of two men for the whole year was required to operate it.

The chief criticisms of this system are: (1) The cropping system is not a good one for a farm of this size in this area because it does not permit a systematic plan of crop rotation. The corn acreage is too

Fig. 9.—SPRING WHEAT IS THE MAJOR CROP.
Wheat will likely continue to be the most important single crop grown in this region. Yields may be increased by having wheat in a systematic crop rotation.

small to permit a satisfactory livestock enterprise. In addition to providing feed for livestock, corn has an important place in this area as a means of weed control. This cultivated crop is necessary in a region where small grain is often cropped during successive years. The wheat, or cash crop, is too large for a 240 acre farm if a well balanced system, including livestock, is to be established. At the same time, too much tillable land is used on this farm for low-producing permanent pasture. In general, farms of this size should grow a greater percentage of corn than larger farms, and the pasture crops should be such as to give a maximum yield of feed per acre. On a 240 acre farm, which is a "small" farm in this area, a good system will provide enough feed and pasture to maintain a large livestock enterprise that will utilize the available labor and distribute this throughout the year.

(2) The livestock system would be better balanced, and the returns from the farm greater, if the hog enterprise were large enough to consume the surplus of feed grains now being sold from the farm. If the wheat acreage is reduced, as suggested above, and additional feed crops substituted, quite an increase in the livestock system is necessary on this farm.

SYSTEM NO. 2. (240 acre farms).

This system is suggested for the farmer who is either near a good market for whole milk or has boys of school age that can do a large part of the milking before and after school.

A six year rotation of corn, oats, corn, barley, wheat and sweet clover pasture is suggested. This rotation requires somewhat less labor than the cropping system in System No. 1, and the labor is more evenly distributed. This permits more time to be spent on livestock. One-sixth of the land in the regular rotation would be growing legumes which should very nearly maintain the nitrogen and humus content of the soil. An additional field of alfalfa is suggested to provide legume pasture for the hogs and plenty of good quality legume hay for the cows. A small amount of prairie hay would be cut from the unimproved land for horse feed each year. Additional legume hay can be cut from the sweet clover pasture when needed.

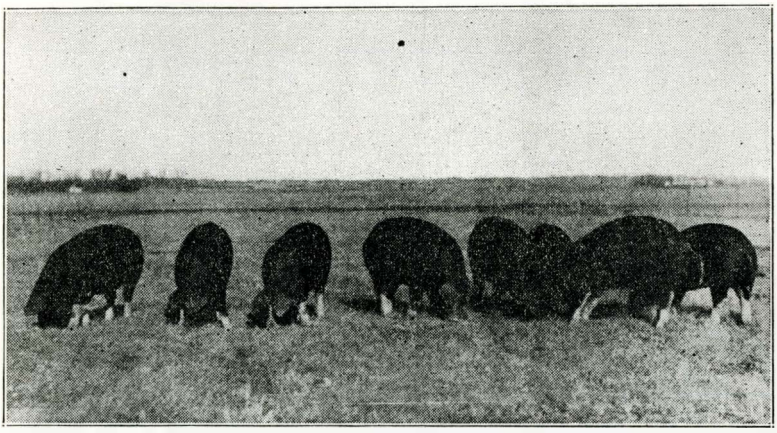

Fig. 10.—A GOOD MARKET FOR FEED GRAINS AND PASTURE.
Hogs furnish one of the best markets for feed grains. Good breeding combined with sanitation and proper feeding make possible greater returns for grain fed than by selling the grain for cash.

The livestock suggested are 6 horses, 20 dairy cows, 10 head of young stock, 13 brood sows and 200 hens. This combination of livestock enterprises with the crops suggested should give maximum utilization of all farm resources such as land, labor, buildings, feed, etc. It is a good system for the man who has a large amount of family labor to utilize. It will also provide a good market for a large amount of cheap roughage as well as all feed grains produced.

The dairy enterprise is large enough to properly utilize a milking machine and other such special dairy equipment. It is also large enough to warrant careful selection, feeding and care of the cows. High producing cows, carefully fed are essential to the success of this system.

A high producing herd of cows is ordinarily the result of several years of careful selection of individuals, and for that reason the dairy enterprise should not be quickly disposed of or greatly reduced during periods of low prices for dairy products.

The flexibility of the system lies in the pork enterprise. Pork production requires little capital and labor as compared to other livestock enterprises. In addition, the returns from pork are quickly realized,

and the enterprise can be expanded or reduced without greatly disturbing the rest of the farm business. On farms where butterfat is sold, the skimmilk can be marketed to good advantage through pork.

Possible Variations for System No. 2.—Flax may be substituted for part of the small grain acreage, replacing either wheat or a part of the barley acreage. By reducing the amount of pork produced 5,000 pounds (18 to 24 mature hogs), 20 acres of flax could be grown in place of barley. This change would only be profitable during periods of relatively low hog prices and high flax prices. The advantage of substituting flax for wheat would depend upon the possibility of a relatively better price for flax as compared to wheat.

Fig. 11.—SWEET CLOVER STAND IN JULY, 1926.
This crop fits well into a rotation plan and provides abundant hay and pasture. Seed production is often profitable, and, being a legume, soil fertility is improved. This picture was taken on one of the cooperator's farms in the exceptionally dry year, 1926.

A larger pork enterprise could be supported if another field of barley were substituted for the wheat or a protion of the wheat. For every ten acres of barley substituted for wheat, the pork production could be increased by approximately 2,500 pounds. This would ordinarily mean the breeding of a couple more sows to produce 10 to 12 mature hogs.

SYSTEM NO. 3. (240 acre farms).

The farmer who does not like dairying, or who desires a large amount of flexibility in a system of farming, will find system No. 3 more desirable than systems No. 1 or 2. It is also better suited to the farm which is a long distance from local markets and on which labor, other than the operator's, is performed largely by hired help.

In this system, a five year rotation of corn, oats, corn, barley and sweet clover is suggested and the alfalfa acreage is increased to 20 acres. In this rotation slightly more corn is included than is generally

recommended for this area at the present time. However, the acreage in legumes is also greater, and since it is planned to feed practically all crops raised, a much larger amount of manure than usual will be returned to the soil. Under these conditions it is believed that the fertility will be maintained as well as or better than in system No. 2.

The livestock suggested are 6 horses, 10 cows, 30 head of young stock, 24 sows, and 100 hens. This amount of livestock will completely utilize the crops produced after seed requirements have been deducted from expected yields. It should be noted that this livestock system permits much more flexibility than the livestock in either system No. 1 or system No. 2. The beef cattle may either be roughed through and sold as feeders, or carried along on a growing ration and sold as finished beef. The cows may either be milked or let run with the calves. The large pork enterprise adds to this flexibility. Hogs may be sold heavy or light, and the enterprise may be reduced or expanded during years of high or low hog prices without greatly disturbing the rest of the system.

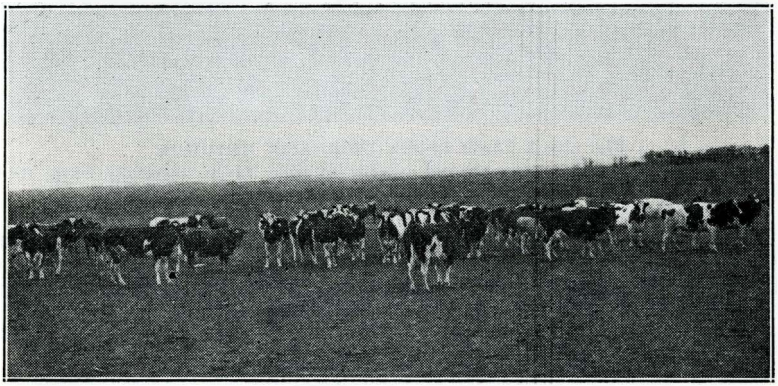

Fig. 12.—A GOOD MARKET FOR BOTH CROPS AND LABOR.
Good dairy cows, regardless of breed, when properly fed and cared for, increase the farm income.

The system as a whole would require less labor than either system No. 1 and 2. It would require two men during the cropping season and a small amount of family help during the rest of the year.

As the income in this system would be entirely from the sale of livestock and livestock products, the success of the operator will depend upon his ability to manage and care for livestock. It is not enough to merely have a certain number of livestock on a farm to insure profits. One must make use of all methods of handling livestock which are known to give better results than others.

In planning a livestock system to consume all crops raised it was assumed that the surplus from years of high yields would be carried over to meet the needs of the system in years of low crop yields.

This system is especially desirable for the farmer who is not permanently located, or who does not have the capital to equip a farm for a system like No. 2. Both hogs and beef cattle can be handled efficiently with a very low investment in buildings and other livestock equipment. In case of necessity, both can be disposed of or replaced at less sacrifice or cost than the livestock in systems No. 1 and No. 2.

Possible Variations for System No. 3.—The pork enterprise may be reduced and a cash crop substituted for oats or barley, a reduction of 10,000 pounds of pork (36 to 48 mature hogs), would permit the growing of 40 acres of wheat or flax in the place of oats or barley. Here again such a change would only be profitable during periods of relatively low

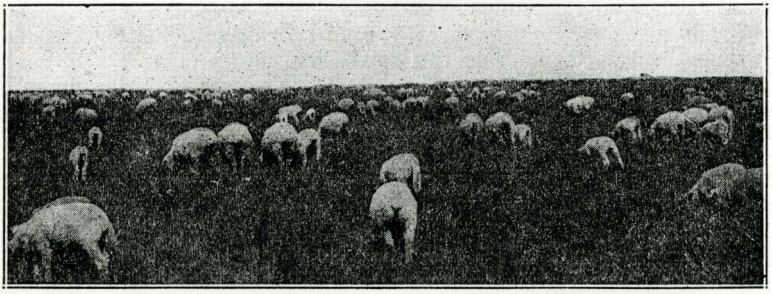

Fig. 13.—A FARM FLOCK INCREASES RETURNS.
A flock of sheep would increase the net returns on many farms, especially where there is a surplus of roughage.

hog prices. Another variation would be to reduce the number of young stock and to increase the number of cows. The advisability of this change would depend upon the quality of cows, the amount of labor available to milk and care for them, and the equipment on the farm.

Good Systems for 320 Acre Farms

Table XII gives the important details of an actual system and two suggested systems for 320 acre farms.

SYSTEM NO. 1. (320 acre farms).

This is a fairly well balanced organization. Although the crops are not systematically rotated, the proportion between cultivated crops, small grain crops, and legumes is good, and there is enough livestock to consume all roughage and a large portion of the feed grains.

This system can be improved by increasing the acreage of both sweet clover and alfalfa and the number of livestock to consume the additional hay and pasture and the surplus of feed grains that are being sold from the farm at the present time.

SYSTEM NO. 2. (320 acre farms).

This system is similar to system No. 2 for 240 acre farms and is adapted to the same conditions of capital, labor and location. It does not differ greatly from the actual farming system designated as sys-

Table XII.—SUGGESTED SYSTEMS OF FARMING FOR 320 ACRE FARMS.*

ITEM	SYSTEM No. 1 An actual farm in Brown County				SYSTEM No. 2 Dairying and Hogs				SYSTEM No. 3 Hogs and Cattle			
		Production (Bus. or Tons)		Income		Production (Bus. or Tons)		Income		Production (Bus. or Tons)		Income
	Acres	Raised	Sold	(Dollars)	Acres	Raised	Sold	(Dollars)	Acres	Raised	Sold	(Dollars)
CROPS:												
Wheat	74	888	799	879	72	864	778	856	42	504	454	499
Oats	72	2,160	252	76	36	1,080	---	---	42	1,260	---	---
Barley	35	936	621	310	36	864	---	---	42	1,008	---	---
Corn, husked and hogged	57	1,539	581	320	48	1,296	---	---	84	2,268	---	---
Corn, cut for fodder	23	54	---	---	14	21	---	---	---	----	---	---
Corn, cut for silage					10	50	---	---	---	----	---	---
Potatoes	1	80	68	41	1	80	68	41	1	80	68	41
Sweet Clover Pasture	25	----	---	---	36	----	---	---	42	----	---	---
Alfalfa	13	26	---	---	28	46	---	---	28	38	---	---
Alfalfa						Hogpasture	---	---	---	Pasture	---	---
Unimproved					30	12	---	897	30	12	---	540
				1,626								
LIVESTOCK:	Nos.	Production			Nos.	Production			Nos.	Production		
Work Horses	9				8				8	2 Head		200
Colts									6			
Dairy Cows	12	3,000 lbs. B. F.		1,200	20	5,000 lbs. B. F.		2,000				
		2 Cows		160		3 cows		240				
Dairy Young Stock	10	10 Veal Calves		150	20	12 Head		384				
Milk Cows									12	2,100 lbs. B. F.		840
										2 Cows		120
Other Cattle									35	12 Head		840
Brood Sows	10	12,500 lbs. Pork		1,000	14	17,500 lbs. Pork		1,400	25	31250 lbs Pork		2,500
Ewes	20	160 lbs. Wool		48								
		1,600 lbs. Mutton		176								
Poultry	150	Eggs and meat		262 2,996	100	Eggs and Meat		175 4,199	100	Eggs and meat		175 4,675
TOTAL INCOME:				4,622				5,096				5,215
EXPENSES:	In-vest-ment	Dollars			In-vest-ment	Dollars			In-vest-ment	Dollars		
Improvements		407				405				377		
Upkeep		387				372				358		
Taxes and Insurance		319				336				320		
Seed, Twine and Threshing		493				400				323		
Veterinary and Medicine		31				63				129		
Feed and Handling Feed		173				201				426		
Labor		750				750				750		
Interest on Investment @ 5%	$26,602	1,330		3,890	$ 27,972	1,398		3,925	$26,700	1,335		4,918
OPERATOR'S LABOR AND MANAGEMENT WAGE:				732				1,171				1,197
Labor Requirements:												
Crops (man hours)		2,025				1,764				1,723		
Livestock (man hours)		3,077				3,907				3,531		
TOTAL:		5,102				5,671				5,254		
Labor Force Required		2 men, 12 months				2 men, 12 months				2 men, 12 months		

*(See Table XI.)

tem No. 1. A well balanced, systematically rotated cropping system, with a greater amount of livestock to consume the feed crops and pasture produced are the chief differences.

A seven year rotation of corn, oats, wheat, corn, barley, wheat, and sweet clover is suggested with an additional field of alfalfa. Allowance is also made for a certain amount of unimproved land. The long rotation permits the growing of a fairly large acreage of wheat and at the same time keeps the amount of legumes in the rotation in balance with the feed grains produced and small enough to be economically utilized.

The number of dairy cows and young stock suggested is large enough to utilize the hay and pasture and to permit the economical use of a milking machine and other labor saving equipment. Here again high producing cows are necessary to justify the large amount of labor that would be expended on this enterprise.

The pork enterprise is just large enough to consume all feed grains not needed to balance up the ration for the other classes of livestock.

Possible Variations for System No. 2.—Barley may be substituted for a part of the wheat acreage and the additional barley used to increase the swine enterprise. For every 10 acres of barley substituted for wheat, the pork production could be increased 2,500 pounds (10 to 12 mature hogs).

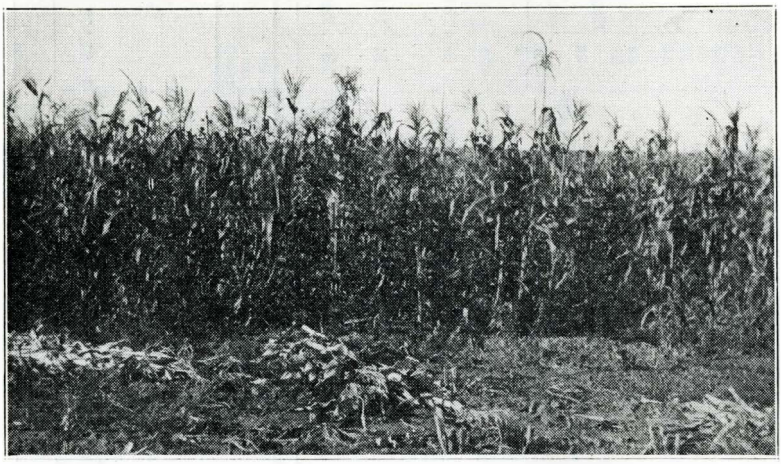

Fig. 14.—A GOOD ROTATION CALLS FOR CORN.
Corn, with other feed grains, is increasing in acreage. Adapted varieties, proper seed selection and cultivation are necessary for continued success.

The size of the dairy enterprise may be varied depending upon the amount of available labor. If the number of cows is decreased, the number of other cattle should be increased to utilize the additional feed and pasture. If the number of cows is increased, the number of other cattle and possibly the hogs would need to be reduced.

The number of young cattle could be kept at a minimum and a small flock of sheep kept to utilize the surplus hay and pasture.

SYSTEM NO. 3. (320 acre farms).

A six year rotation of corn, oats, wheat, corn, barley and sweet clover with an additional field of alfalfa for hog pasture and hay is suggested for this system. This gives a small acreage of wheat and a large acreage of feed grains and legumes.

The livestock suggested include eight horses, six colts, 12 milk cows, 35 other cattle, 25 brood sows, and 100 hens.

This area is normally in the surplus horse producing section of the country. Because of the large amount of cheap roughage available, horses can be produced to good advantage in this area. In system No. 3

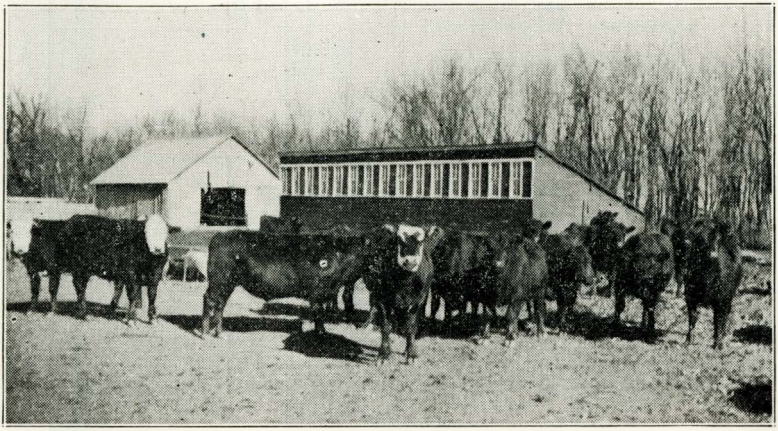

Fig. 15.—A GOOD MARKET FOR ROUGHAGE.
Steer feeding makes possible the utilization of roughage that might otherwise be wasted. Like hog feeding, this enterprise adds flexibility to the farming system.

two colts would be foaled each year and two horses sold before they started to decline in market value. A good type of draft horse should be produced if this plan is to be profitable.

The rest of the livestock system is similar to the hog and cattle system No. 3, suggested for 240 acre farms. It has more flexibility than system No. 2, and therefore is better suited to the needs of the man who is not permanently located or who has limited capital.

Any one of these three systems can be handled by two men or the equivalent in family labor. Systems 2 and 3 require slightly more hours of labor than system No. 1, but the labor is better distributed and can easily be handled by the same labor force.

Possible Variations for System No. 3.—A good "hog man" would find it profitable to substitute barley for the wheat grown in this system and use the additional feed for increased pork production. If all of the wheat were replaced with barley, approximately 10,000 pounds more pork could be produced (36 to 48 mature hogs).

Table XIII—SUGGESTED SYSTEMS OF FARMING FOR 480 ACRE FARMS.*

ITEM	SYSTEM No. 1 An Actual Farm in Brown County				SYSTEM No. 2 Hogs, Sheep and Dairying				SYSTEM No. 3 Steers and Hogs			
		Production (Bus. or Tons)		Income		Production (Bus. or Tons		Income		Production (Bus. or Tons)		Income
	Acres	Raised	Sold	(Dollars)	Acres	Raised	Sold	(Dollars)	Acres	Raised	Sold	(Dollars)
CROPS:												
Wheat	110	1,320	1,188	1,307	112	1,344	1,210	1,331	112	1,344	1,210	1,331
Oats	68	2,040			56	1,680			56	1,680		
Barley	52	1,248			56	1,344			56	1,344		
Corn, husked and hogged	75	2,025			112	3,024			112	3,024		
Corn, cut for fodder	17	26										
Potatoes	2	160	136	81	1	80	68	41	1	80	68	41
Sweet clover pasture					56				56			
Alfalfa	8	16			28	38			28	38		
Alfalfa						Hogpasture				Hogpasture		
Unimproved	77	17		—— 1,388	50	25		—— 1,372	50	25		—— 1,372
LIVESTOCK:	Nos.	Production			Nos.	Production			Nos.	Production		
Work Horses	12				12				12	2 Head		200
Colts									6			
Dairy Cows					12	3,000 lbs. B.F.		1,200				
						2 cows		160				
Dairy Young Stock					6	8 calves		40				
Milk Cows	7	1,225 lbs. B. F.		490					8	1,400 lbs. B. F.		560
Other Cattle	26	10 Head		840					16	6 Head		480
Steers									40	40,000 lbs. Beef		3,200
Brood Sows	30	37,500 lbs. Pork		3,000	32	40,000 lbs. Pork		3,200	24	30,000 lbs. Pork		2,400
Ewes					125	1,000 lbs. Wool		300				
						10,000 lbs. Mutton		1,100				
Poultry	200	Eggs and meat		350 4,680	200	Eggs and meat		350 6,350	100	Eggs and meat		175 7,015
TOTAL INCOME:				6,068				7,722				2,327
EXPENSES:	Investment	Dollars			Investment	Dollars			Investment	Dollars		
Improvements		502				531				511		
Upkeep		506				537				517		
Taxes and Insurance		420				472				467		
Seed, Twine, Threshing		580				609				590		
Veterinary and Medicine		93				113				100		
Feed and Handling Feed		498				531				408		
40 Steers @ 450 lbs.										1,080		
Labor		950				1,125				1,125		
Interest on Investment at 5%	$35,019	1,750		5,299	$39,292	1,965		5,883	$38,896	1,945		6,743
OPERATOR'S LABOR AND MANAGEMENT WAGE:				769				1,839				1,644
Labor Requirements:												
Crops (man hours)		2,351				2,611				2,611		
Livestock (man hours)		3,507				4,355				4,179		
TOTAL		5,858				6,966				6,790		
Labor Force Required	2 men, 12 months; 1 man, 3 months				2 men, 12 months; 1 man, 6 months				2 men, 12 months; 1 man, 6 months			

*(See Table XI.)

A few good dairy cows and a flock of sheep to utilize the available hay and pasture land could be substituted for the cattle enterprise in this system. Eight high producing cows and 100 ewes would use about the same amount of feed and somewhat more labor than the cattle enterprise included in this system.

Good Systems for 480 Acre Farms

A system followed on an actual farm and two suggested systems for 480 acre farms are shown in Table XIII.

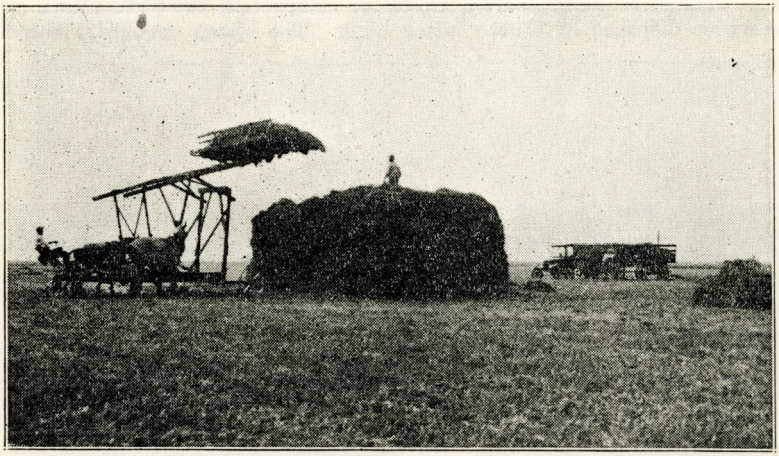

Fig. 16.—LOW COST METHOD OF HARVESTING HAY.
One method of stacking hay used on a cooperator's farm. Labor saving practices tend to increase profits.

The cropping system in system No. 1 is well balanced except for the lack of legumes. The livestock system combines well with the cropping system; all feed crops being completely utilized. However, much better use could be made of the pasture land available on this farm.

SYSTEM NO. 2. (480 acre farms).

A seven year rotation of corn, oats, wheat, corn, barley, wheat, and sweet clover is suggested for this system. An additional field of alfalfa for hay and hog pasture is also suggested. Fifty acres of land is allowed for permanent pasture, wild hay and waste.

The livestock system consists of 12 horses, 12 dairy cows, six heifers, 32 brood sows, 125 ewes and 200 hens.

Only the best heifer calves would be saved; the others would be disposed of as soon as possible after they were dropped.

The 125 ewes and their lambs would, with the cattle suggested, completely utilize the hay, pasture, and other roughage available in this system. The pork enterprise is just large enough to consume all feed grains left after the other livestock are provided for, and after deducting enough for seed.

This system would require more specialized knowledge and somewhat more and better equipment than would system No. 1. It would also require more labor. The time of two men or its equivalent would be required for the full year and in addition an extra man would be needed for six months during the cropping season.

Possible Variations for System No. 2.—On farms where equipment and labor is avaliable for handling a large dairy enterprise, the number of cows could be increased to 20 or more and just enough young stock kept to permit the culling out of a few of the older and poorer cows. Only the better heifer calves would be saved and the rest vealed or otherwise disposed of shortly after birth. The sheep enterprise would

Fig. 17.—BIG TEAMS REDUCE PRODUCTION COSTS.
The large fields and level land in this area makes possible the use of large machines. The "tying-in" and "bucking-back" system of hitching gives one man control over many horses.

be dropped and about one-half of the sweet clover cut for seed. This change would not greatly affect the returns and would have the advantage of being less complicated than the original system.

SYSTEM NO. 3. (480 acre farms).

The same cropping system used in system No. 2 is suggested for system No. 3. The livestock suggested are 12 horses, six colts, eight milk cows, 16 other cattle, 40 steers, 24 brood sows, and 100 hens.

The steers would be purchased as calves early in the fall, roughed through the winter, pastured on sweet clover and put in the feed lot during the second winter. They would be fed enough grain during the first winter to keep them doing well.

The success of this system would depend to a large extent on the ability of the operator in buying and selling cattle, and in feeding cattle and hogs.

It would require about the same amount of labor as system No. 2 but more of the livestock labor would come in the winter time so that the work could easily be done by the same labor force.

This system contains more flexibility than system No. 2 and for that reason would be better suited to the man who is not permanently located or who lacks the capital to install a more permanent system.

Possible Variations for System No. 3.—On farms where the equipment is available for a large cattle enterprise, baby beef production could be substituted for the cattle suggested in this system. By using corn, stover, and alfalfa for wintering the cows, a herd of 35 cows and their calves could be maintained on the feeds available. Allowing for losses in calves and for the replacement of cows, about 26 head of baby beef calves could be sold each year, and in addition about five head of culled cows. This system would also permit the production of about 3,000 pounds more pork (12 to 15 mature hogs). The returns would be approximately the same for both systems.

Another variation would be to replace a part of the wheat acreage with barley and increase the amount of pork produced. For each ten acres of barley grown in place of wheat, the pork production could be increased 2,500 pounds (10 to 12 mature hogs).

640 Acre Farms

A study of the organization of 640 acre farms in comparison with 480 acre farms shows very little difference between the two. The same proportion of crops and the same kinds and proportions of livestock seem to fit either size about equally well. For this reason no outlines are presented for 640 acre farms. It is believed that the systems suggested for 480 acre farms can be applied equally well on 640 acre farms. In line with the tendency to grow more wheat on the larger farms, it may be advantageous to put a part of the acreage devoted to oats and barley into wheat. The amount of wheat grown should be varied with the amount of livestock that can be handled with the equipment and labor available on the farm.

Other Possible Variations

The production of sweet clover seed is an alternative for those farmers who wish to include a legume in the rotation and whose farms cannot be stocked with enough livestock to completely utilize the sweet clover as pasture and hay. Bee-keeping, the raising of purebred livestock for sale and the growing of high quality seed of various kinds, are other possibilties of intensifying the farming operations.

Because of the comparatively wide spread between feed prices and prices of livestock and livestock products in this area, as compared with other surplus producing areas, it should be profitable for a limited number of farmers to increase their livestock enterprises by the purchase of additional feed. This practice should be limited to farms that are or can be properly equipped for large-scale feeding, and on which the operators have special talents for buying, selling and feeding livestock. It should also be limited to livestock enterprises such as cattle, hog and lamb feeding, which can easily be expanded or reduced as the conditions of local feed supply and the prices of feeder stock seem to indicate.

Incomes on many farms may be increased as much, or more, by improvements in the practices followed, as by adjustments in the combination of enterprises or system of farming. Attention is again called to the fact that the yield from crops and livestock, and the production requirements used as a basis for testing out the foregoing systems of farming, are only slightly better than the average accomplishments of the group of farms studied. It should easily be possible for individual farmers who follow the best practices in the production of crops and lievstock to get much better results from the same systems than is indicated in the foregoing tables. For example, several farms among those studied secured yields that were fully 50 per cent greater than the yields used as standards in this bulletin. There were also farms in this same group on which the cows averaged from 50 to 100 pounds of butterfat more per cow than the standard figures used in planning these suggested systems.

Similar differences were obtained in the production of pork and poultry products. These differences can be very largely explained by differences in practices followed in the production of these various crops and livestock products. **The largest returns are ordinarily secured on those farms where a well selected group of enterprises are combined with practices which give high yields from both crops and livestock.**

APPENDIX

The following tables give the labor and materials used for crop and livestock production on each of the farms studied. The amount of labor used in performing each crop operation and the number of times each operation was performed is also shown.

These data show that there is a wide variation in the time required to perform the same operation on different farms. These variations are due to a variety of factors among which the following are important:

1. Variations in the size of machines and teams.
2. Variations in the size and quality of horses. Also in the type of hitch used.
3. Variations in the size and shape of fields.
4. Variations in the type and condition of soils. This is largely due to the cropping system practiced in the past.
5. Varying weather conditions.
6. Timeliness of performing the operations—a very important factor.
7. Thoroughness of seedbed preparation.
8. Machinery trouble.
9. Down grain—often resulting from use of unadapted varieties or poor seed.
10. Differences in the standards of performance set by different farmers. With the same sized teams and machines, one farmer may expect to cover 20 acres per day, whereas another may figure that 15 acres is a good day's work.

Of these causes, perhaps the most important in explaining the variations between farms are the variations in the size of machines and teams, the timeliness of planting, and the standards of performance set by different farmers.

Similar variations are found between farms in the amount of feed and labor used to produce livestock and livestock products. These variations are due principally to the methods of handling livestock on the different farms. Low feed and labor requirements for the production of livestock and livestock products are usually due to one or more of the following reasons.:

1. High grade healthy livestock.
2. Feeding of balanced rations.
3. Small death losses, due largely to sanitary practices.
4. Convenient arrangement of buildings and lots for handling stock.
5. Size of livestock enterprises.

It will be noted that most of the causes for variations in the case of both crops and livestock are largely within the control of the farmer.

Table XIV.—STATEMENT OF FARM EARNINGS, 13 FARMS, BROWN COUNTY, SOUTH DAKOTA, 1925.

Farm No.	Average Investment	Cash Receipts	Increase in Inventory	Products Used in House	Total Income	Cash Expenses	Decrease in Inventory	Value Unpaid Labor	Total Expenses	Operator's Earnings *	Labor and Management Wage†	Rate Earned on Investment‡
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Per Cent
13	26,512	6,402	790	217	7,409	2,906	----	308	3,215	4,194	2,868	12.23
10	23,619	6,868	39	168	7,075	3,771	----	282	4,053	3,022	1,342	10.50
6	45,279	8,731	85	366	9,182	4,239	----	991	5,230	3,952	1,687	7.40
14	53,097	9,473	2,031	397	11,901	5,790	----	1,448	7,238	4,663	2,008	7.27
12	53,417	9,119	565	306	9,990	4,178	----	1,040	5,218	4,772	2,101	6.93
1	28,560	5,472	244	315	6,031	2,956	----	561	3,517	2,514	1,086	6.28
2	29,756	6,958	----	195	7,153	2,976	641	1,107	4,724	2,429	941	6.04
19	32,672	6,723	----	282	7,005	3,372	73	699	4,144	2,861	1,227	5.52
3	23,534	4,195	----	248	4,443	1,564	679	248	2,490	1,952	775	4.00
20	24,158	4,828	164	172	5,164	2,744	----	524	3,268	1,896	688	3.68
4	27,235	7,454	673	296	8,323	6,012	----	504	6,516	1,808	446	3.59
18	25,206	3,646	----	272	3,918	1,384	607	165	2,156	1,762	501	3.52
7	31,945	7,502	----	242	7,744	4,020	1,652	507	6,179	1,564	33	2.65
Avgs.	32,692	6,721	65	267	7,053	3,532		644	4,176	2,877	1,249	6.23

Note: *. The Operator's Earnings are what is left of the Farm Income after deducting all Expenses except Interest on the Investment and the Value of the Operator's Labor.

†The Labor and Management Wage is found by deducting 5 per cent on the Investment from the Operator's Earnings.

‡ Rate Earned on the Investment is found by deducting the Value of the Operator's Labor from the Operator's Earnings and dividing by the Average Investment, then multiply by 100.

Table XV.—STATEMENT OF FARM EARNINGS, 13 FARMS, BROWN COUNTY, SOUTH DAKOTA, 1926.

Farm No.	Average Investment	Cash Receipts	Increase in Inventory	Products Used in House	Total Income	Cash Expenses	Decrease in Inventory	Value Unpaid Labor	Total Expenses	Operator's Earnings *	Labor and Management Wage †	Rate Earned on Investment ‡
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Per Cent
13	25,727	6,593	--	244	6,837	4,048	601	356	5,005	1,832	545	3.39
10	23,089	4,467	--	217	4,684	2,085	1,099	298	3,482	1,202	48	2.37
6	45,092	4,998	--	344	5,342	3,732	585	394	4,711	631	—1,620	—.12
14	51,961	10,519	--	304	10,823	4,683	4,303	971	9,957	866	—1,731	.37
12	52,625	7,409	--	333	7,742	4,147	1,189	1,116	6,452	1,290	—1,341	.18
1	30,224	3,116	--	372	3,488	1,957	915	846	3,718	—230	—1,742	—3.30
2	29,358	5,691	--	311	6,002	4,583	155	1,004	5,742	260	—1,208	—1.26
19	31,986	6,345	--	169	6,514	3,937	1,299	752	5,988	526	—1,073	—1.52
3	22,198	2,745	--	295	3,040	1,029	1,992	103	3,124	—84	—1,194	—4.55
20	24,018	5,701	--	205	5,906	3,530	443	509	4,482	1,424	223	1.59
4	27,388	7,707	--	357	8,074	7,860	568	410	8,638	—564	—1,933	—5.08
18	24,906	2,588	7	269	2,864	1,649	----	146	1,795	1,069	—176	.85
7	29,997	3,862	--	380	4,242	1,774	2,245	394	4,413	—171	—1,672	—2.94
Avgs.	30,813	5,519	--	292	5,811	3,463	1,168	561	5,192	619	—913	—.47

Note: *The Operator's Earnings are what is left of the Farm Income after deducting all Expenses except Interest on the Investment and the Value of the Operator's Labor.

†The Labor and Management Wage is found by deducting 5 per cent on the Investment from the Operator's Earnings.

‡Rate earned on the Investment is found by deducting the Value of the Operator's Labor from the Operator's Earnings and dividing by the Average Investment, then multiply by 100.

Table XVI.—DISTRIBUTION OF TOTAL MAN LABOR, 1925

Farm No.	Crop Acreage	Productive Livestock	Real Estate	Equipment	General Farm	Total Maintenance	Crops	Livestock	Manure Hauling	Preparing and Handling		Marketing		Total Labor on Farm	Maintenance of Total Labor	Labor off Farm
										Seed	Feed	Crops	Livestock			
	Acres	A. U.	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	PerCent	Hours
13	284	36.0	229	211	52	492	1,868	2,391	191	99	318	42	125	5,526	8.9	483
10	276	18.7	126	16	25	167	1,968	1,770	25	55	108	28	89	4,190	4.0	158
6*	448	16.6	217	279	224	720	2,814	2,142	320	315	258	220	143	6,932	10.4	106
14*	624	44.3	304	647	327	1,278	3,497	6,065	190	116	397	160	118	11,821	10.8	687
12	548	48.2	632	552	336	1,520	3,795	4,412	422	264	360	149	152	11,064	13.7	228
1	362	30.2	81	42	60	183	2,220	2,882	77	49	253	8	107	5,779	3.2	130
2*	288	29.7	276	246	27	549	1,664	4,026	181	27	275	46	78	6,846	8.0	292
19*	324	33.5	430	360	158	948	2,622	4,587	651	162	331	54	77	9,432	10.0	353
3	261	37.3	261	240	45	546	1,846	1,970	99	127	232	34	85	4,939	11.1	336
20*	193	26.6	242	246	52	540	1,676	3,728	513	52	213	55	32	6,809	7.9	1,592
4*	289	38.0	810	529	412	1,751	3,108	2,482	600	487	660	18	144	9,250	18.9	151
18	244	19.6	96	184	84	364	1,351	1,717	103	27	84	150	132	3,928	9.3	99
7*	378	21.2	165	79	34	278	2,293	2,686	113	24	122	88	75	5,679	4.9	487
Avs.	348	30.8	298	279	141	718	2,371	3,143	268	139	278	81	104	7,092	10.1	392

*Farms using tractors.

Table XVII.—DISTRIBUTION OF TOTAL HORSE AND TRACTOR WORK, 1925.

Farm No.	Crop Acres per Horse	Work Horses	Real Estate	Equipment	Gen'l Farm	Total Maintenance	Crops	Livestock	Manure Hauling	Preparing and Handling		Marketing		Total Labor on Farm	Maintenance of Total Labor	Labor off Farm
										Seed	Feed	Crops	Livestock			
	Acres	No.	Hours	Hrs.	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Per Cent	Hours
Horse work																
13	29.8	9.5	51	45	13	109	5,422	79	368	54	638	56	203	6,929	1.45	306
10	34.5	8.0	84	--	---	84	5,610	40	46	5	188	48	70	6,091	1.38	295
6*	38.6	11.6	42	34	32	108	5,032	5	591	15	333	12	40	6,136	1.76	---
14*	38.5	16.2	41	52	26	119	8,821	402	353	4	540	196	4	10,439	1.14	577
12	32.6	16.8	258	84	117	459	11,964	212	765	45	398	309	148	14,295	3.21	262
1	27.4	13.2	---	4	12	16	7,052	32	208	12	462	12	76	7,870	.23	260
2*	32.8	8.8	176	--	6	182	4,288	40	342	4	337	82	34	5,309	3.42	343
19*	36.0	9.0	181	36	125	342	5,180	21	1,083	10	458	91	32	7,217	4.74	695
3	42.1	6.2	108	26	17	151	4,394	91	179	--	424	60	66	5,365	2.81	583
20*	33.3	5.8	79	30	10	119	3,427	12	1,005	4	327	56	9	4,959	2.40	295
4*	48.2	6.0	52	6	64	122	4,194	1,083	1,146	13	538	36	70	7,202	1.69	236
18	38.7	6.3	90	49	90	229	4,638	58	226	24	172	316	18	5,681	4.03	186
7*	31.5	12.0	70	2	50	122	6,452	38	209	22	222	176	116	7,357	1.64	732
Averages	34.8	10.0	95	28	43	166	5,882	163	502	16	387	112	68	7,296	2.28	472
Tractor Work																
6							341				--					
14							293				--					
2							117				32					
19							253				--					
20							145				--					
4							489				75					
7							146				--					

Table XVIII.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE FOR SEED BED PREPARATION, ONE TIME OVER, 1925

Farm No.	Plowing				Discing				Tandem Discing				Harrowing			
	Man	Horse	Tractor	Size plow	Man	Horse	Tractor	Size Disc	Man	Horse	Tractor	Size Disc	Man	Horse	Tractor	Size Harrow
	Hours	Hours	Hours	Inches	Hours	Hours	Hours	Feet	Hours	Hours	Hours	Feet	Hours	Hours	Hours	Feet
13	1.51	10.20	----	28-42	.58	2.86	--	10	--	--	--	--	.26	1.16	--	26
10	2.21	10.20	----	28	.47	2.10	--	8	--	--	--	--	.18	.81	--	26
6*	1.03	1.19	.78	28-56	--	----	--	--	--	--	--	--	.19	.75	--	26
14*	1.10	.94	.92	28-56	--	----	--	--	.52	--	.52	10	.21	1.26	--	26
12	1.29	9.90	----	28-42	.51	3.02	--	10	--	--	--	--	.23	1.26	--	26
1	1.34	10.70	----	28-42	.52	3.11	--	9	--	--	--	--	.21	1.27	--	26
2*	1.51	8.80	.18	42-56	.42	1.52	.25	9	--	--	--	--	.20	.96	--	26
19*	1.25	2.14	.85	28-56	--	----	--	-	.52	--	.52	10	.26	1.02	--	20
3	2.09	8.37	----	28-42	.63	2.54	--	9	--	--	--	--	.32	1.24	--	26
20*	1.32	3.45	.48	28-42	--	----	--	--	.56	--	.56	10	.31	1.21	--	20
4*	1.00	----	1.00	42	--	----	--	-	.44	--	.44	10	.17	.69	--	26
18	1.30	8.96	----	28-42	.45	2.32	--	9	--	--	--	--	.14	.75	--	36
7*	2.39	9.60	.51	28-42	.52	2.61	--	9	--	--	--	--	.22	1.24	--	26
Avgs.	1.49	6.92	.35		.51	2.67			.50	--	.50	--	.22	1.11	--	

*Farms using Tractors.

Table XIX.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE OF WHEAT, 1925.

Farm No.	Acres	Yield	Plowing		Discing		Harrowing		Seeding	Total Prior to Harvest	Cutting	Shocking	Threshing	Grand Total
		Bushels	Hours	Times Over	Hours	Times Over	Hours	Times Over	Hours	Hours	Hours	Hours	Hours	Hours
MAN LABOR:														
13	100	11.9	1.38	.92	.14	.24	.47	1.82	.45	2.44	.63	.62	1.80	5.49
10	136	13.3	1.61	.73	.13	.26	.13	.73	.37	2.23	.59	.55	2.31	5.68
6*	205	15.6	1.03	1.00	--	--	.38	2.00	.41	1.79	.51	1.04	2.73	6.07
14*	185	11.5	1.63	1.00	--	--	.38	1.81	.43	2.44	.52	.59	1.39	4.94
12	259	10.8	1.09	.85	.10	.19	.43	1.87	.47	2.09	.62	.57	1.44	4.72
1	186	13.1	1.34	1.00	.05	.10	.39	1.90	.38	2.16	.56	.52	1.97	5.21
2*	74	15.8	.96	.64	.15	.36	.13	.64	.38	1.62	.70	.51	1.54	4.37
11*	61	18.2	.51	.41	.22	.85	.26	1.00	.50	1.49	.54	.80	3.33	6.16
3	61	13.9	2.09	1.00	--	--	.32	1.00	.61	3.02	.74	.99	2.12	6.87
9*	47	11.9	1.05	.85	.04	.15	.31	1.00	.50	1.90	.59	.63	3.30	6.42
4*	38	11.2	---	---	.50	2.00	--	---	.50	1.00	.92	.33	7.06	9.31
18	105	14.0	1.30	1.00	--	--	.14	1.00	.38	1.82	.54	.53	1.53	4.42
7*	150	12.8	2.39	1.00	--	--	.22	1.00	.56	3.17	.56	.72	1.56	6.01
AVGS.: 13 Farms														
Man Labor	123	13.1	1.28	.85	.10	.20	.32	1.45	.44	2.14	.58	.67	2.07	5.46
Horse Work	---	---	6.56	---	.26	--	1.60	---	2.05	10.47	2.16	---	3.36	15.99
Tractor Work	---	---	.14	---	.02	--	---	---	---	.16	.02	---	---	.18

*Farms using Tractors.

Table XX.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE OF OATS, 1925.

Farm No.	Acres	Yield	Plowing		Discing		Harrowing		Seeding	Total Prior to Harvest	Cutting	Shocking	Threshing	Grand Total
		Bus.	Hours	Times Over	Hours	Times Over	Hours	Times Over	Hours	Hours	Hours	Hours	Hours	Hours
MAN LABOR:														
13	34	54	.53	.35	.37	.65	.32	1.23	.45	1.67	.65	.98	2.88	6.18
10	23	71	---	---	.47	1.00	---	---	.37	.84	.59	.85	3.26	5.54
6*	98	55	1.03	1.00	---	---	.19	1.00	.41	1.63	.51	1.11	2.95	6.20
14*	81	58	.33	.30	.36	.64	.21	1.00	.43	1.33	.52	.89	2.41	5.15
12	60	65	.32	.25	.38	.75	.34	1.50	.47	1.51	.62	1.07	2.45	5.65
1	44	64	---	---	---	---	.21	1.00	.38	.59	.56	1.14	4.02	6.31
2*	60	58	.36	.24	.31	.76	.20	1.00	.38	1.25	.70	1.22	1.67	4.84
19*	49	52	---	---	.52	2.00	.26	1.00	.50	1.28	.54	1.04	5.53	8.39
3	30	53	---	---	.72	1.00	---	---	.61	1.33	.74	1.95	3.31	7.33
20*	45	61	---	---	.56	2.00	.31	1.00	.50	1.37	.59	.94	4.20	7.10
4*	40	62	---	---	.50	2.00	---	---	.50	1.00	.92	1.60	6.06	9.58
18	39	71	---	---	.45	1.00	.14	1.00	.38	.97	.54	.94	2.29	4.74
7*	72	69	---	---	.52	1.00	.22	1.00	.56	1.30	.56	1.10	2.10	5.06
AVGS:														
Man labor	52	60	.26	.23	.36	.89	.20	.90	.45	1.27	.58	1.10	3.11	6.06
Horse work	---	---	.71	---	1.04	---	.68	---	1.95	4.38	2.01	---	4.83	11.22
Tractor work	---	---	.10	---	.10	---	---	---	---	.20	.06	---	---	.26

*Farms using Tractors.

Table XXI.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE OF BARLEY, 1925.

Averages	Acres	Yield	Plowing		Discing		Harrowing		Seeding	Total Prior to Harvest	Cutting	Shocking	Threshing	Total
Farm No.		Bus.	Hours	Times Over	Hours	Times Over	Hours	Times Over	Hours	Hours	Hours	Hours	Hours	Hours
MAN LABOR:														
13	69	28	.97	.64	.21	.36	.30	1.17	.45	1.93	.63	1.18	3.00	6.74
10	30	44	---	---	.47	1.00	.18	1.00	.37	1.02	.59	1.04	3.20	5.85
14*	106	32	.61	.56	.22	.44	.21	1.00	.43	1.47	.52	.83	2.10	4.92
12	54	35	.58	.45	.32	.62	.28	1.20	.47	1.65	.62	1.08	2.50	5.85
1	38	32	1.34	1.00	---	---	.25	1.20	.38	1.97	.56	.90	2.60	6.03
2*	33	37	---	---	.42	1.00	.20	1.00	.38	1.00	.64	.89	1.30	3.83
19*	20	36	1.25	1.00	.13	.50	.78	3.00	.50	2.66	.54	1.14	2.20	6.54
20*	22	31	1.32	1.00	---	---	.62	2.00	.50	2.44	.59	1.00	2.10	6.13
18	33	24	---	---	.13	.30	.24	1.70	.38	.75	.54	.73	2.20	4.22
7*	72	31	2.39	1.00	---	---	.44	2.00	.56	3.39	.42	.71	2.10	6.62
AVGS:														
Man Labor	48	32	.93	.57	.22	.47	.32	1.45	.46	1.93	.55	.90	2.30	5.68
Horse Work	--	--	4.37	---	.92	---	1.65	---	2.06	9.00	2.09	---	4.28	15.37
Tractor Work	--	--	.21	---	.04	---	---	---	---	.25	.01	---	---	.26

*Farms using Tractors.

Table XXII.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE OF HULLESS OATS, SPELTZ AND FLAX, 1925.

Averages	Acres	Yield	Plowing		Discing		Harrowing		Seeding	Total Prior to Harvest	Cutting	Shocking	Threshing	Grand Total
		Bus.	Hours	Times Over	Hours	Times Over	Hours	Times Over	Hours	Hours	Hours	Hours	Hours	Hours
Hulless Oats: 4 farms														
Man Labor	33	32	.89	.76	.19	.38	.19	.84	.45	1.72	.55	.73	2.71	5.71
Horse Work	—	—	1.05	—	.91	—	.76	—	1.80	4.52	2.07	—	3.48	10.07
Tractor Work	—	—	.58	—	—	—	—	—	—	.58	.02	—	—	.60
Speltz: 4 farms														
Man Labor	17	42	.27	.27	.39	.73	.24	.97	.46	1.36	.55	—	2.32	4.23
Horse Work	—	—	.24	—	1.12	—	1.19	—	1.95	4.50	2.38	—	4.20	11.08
Tractor Work	—	—	.24	—	.19	—	—	—	—	.43	—	—	—	.43
Flax: 3 farms														
Man Labor	13	9	1.58	1.00	.56	1.00	.29	.68	.53	2.96	.61	—	2.34	5.91
Horse Work	—	—	5.04	—	1.19	—	.36	—	2.09	9.68	2.41	—	3.63	15.72
Tractor Work	—	—	.44	—	.26	—	—	—	—	.70	—	—	—	.70

Table XXIII.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE OF CORN, 1925.

Farm No.	Acreage	Plowing		Discing		Harrowing		Planting	Packing		Cultivating		Total Prior to Harvest
	Acres	Hours	Times Over	Hours	Times Over	Hours	Times Over	Hours	Hours	Times Over	Hours	Times Over	Hours
MAN LABOR													
13	55	1.51	1.00	--	--	.65	2.50	.71	.27	1.00	3.96	4.00	7.10
10	75	2.21	1.00	--	--	.52	2.90	.67	--	--	3.48	3.00	6.88
14*	135	1.35	1.00	.28	.74	.31	1.20	.71	.25	.74	2.50	2.70	5.40
12	108	1.29	1.00	.06	.11	.48	2.10	.71	--	--	3.00	3.00	5.54
1	60	1.34	1.00	--	--	.61	2.90	.73	--	--	3.15	3.00	5.83
2*	80	1.51	1.00	.09	.39	.52	2.60	.56	.31	1.00	3.29	3.40	6.28
19*	72	1.25	1.00	.44	2.00	.78	3.00	.70	--	--	2.34	3.00	5.51
3	64	2.09	1.00	--	--	1.15	3.60	.74	--	--	2.74	2.80	6.72
20*	37	1.32	1.00	--	--	1.24	4.00	.56	--	--	2.07	3.00	5.19
4*	87	1.00	1.00	.50	2.00	.17	1.00	.85	.51	1.00	3.04	4.00	6.07
18	65	1.30	.72	.12	.28	.42	3.00	.60	.24	.72	2.94	3.00	5.62
7*	60	2.15	.90	.10	.20	.44	2.00	.68	--	--	3.81	3.00	7.18
AVERAGES: 12 Farms													
Man Labor	75	1.47	.97	.14	.51	.57	2.61	.70	.15	.41	3.01	3.13	6.04
Horse Work	--	6.72	----	.57	--	2.72	----	1.40	.69	--	9.34	----	21.44
Tractor work	--	.31	----	.05	--	----	----	----	--	--	----	----	.36

*Farms using Tractors.

Table XXIV.—MAN LABOR, HORSE AND TRACTOR WORK USED PER ACRE OF CORN, 1925

Farm No.	Total Acreage	Total Prior to Harvest	Bundle Corn					Hand Husked Corn				Machine Husked Corn			
			Acres	Yield	Cutting	Shocking	Grand Total	Acres	Yield	Husking	Grand Total	Acres	Yield	Husking	Grand Total
	Acres	Hours		Tons	Hours	Hours	Hours		Bushels	Hours	Hours		Bushels	Hours	Hours
MAN LABOR:															
13	55	7.10	9	2.0	1.40	1.30	9.80	--	---	---	----	--	---	---	---
10	75	6.88	32	1.1	2.00	2.10	10.98	--	---	---	----	22	10.5	2.60	9.48
14*	135	5.40	14	.9	1.70	.50	7.60	--	---	---	----	42	13.6	1.50	6.90
12	108	5.54	19	1.3	1.50	.90	7.94	59	27.0	5.19	10.73	--	---	---	---
1	60	5.83	37	.5	1.30	.90	8.03	9	7.0	3.70	9.53	--	---	---	---
2*	80	6.28	37	.6	1.30	.40	7.98	8	7.6	5.73	12.01	8	7.6	1.90	8.18
19*	72	5.51	--	--	---	---	----	15	2.0	2.14	7.65	--	---	---	---
3	64	6.72	--	--	---	---	----	--	---	---	----	37	16.0	2.00	8.72
20*	37	5.19	13	1.1	1.40	.90	7.49	--	---	---	----	--	---	---	---
4*	87	6.07	28	1.4	2.10	4.20	12.37	--	---	---	----	21	17.0	6.20	12.27
18	65	5.62	18	.9	1.50	.30	7.42	--	---	---	----	47	21.4	2.40	8.02
7*	60	7.18	8	.7	1.60	1.70	10.48	7	6.9	3.66	10.84	17	6.9	1.30	8.48
AVERAGES: 12 Farms															
Man Labor	75	6.04	--	.9	1.62	1.00	8.66	--	18.3	4.52	10.56	--	15.1	2.46	8.50
Horse Work	---	21.44	--	--	4.86	---	26.30	--	---	8.40	29.84	--	---	7.65	29.09
Tractor Work	---	.36	--	--	---	---	.36	--	---	---	.36	--	---	.40	.76

*Farms using Tractors.

Table XXV.—MAN LABOR AND HORSE WORK USED PER ACRE OF HAY, 1925.

AVERAGES	Acres	Yield	Cutting	Raking	Stacking Using Stacker		Grand Total	Stacking Using Wagons		Grand Total	Hauling to Barn		Grand Total
		Tons	Hours	Hours	Acres	Hours	Hours	Acres	Hours	Hours	Acres	Hours	Hours
Alfalfa, 1st cutting: 8 Farms:													
Man Labor	28	1.6*	.95	.56	16	2.60	4.11	2	4.74	6.25	10	4.55	6.06
Horse Work	--	--	1.90	1.12	--	3.15	6.17	-	7.43	10.45	--	7.21	10.23
Alfalfa, 2nd cutting: 7 Farms:													
Man Labor	25	*	.57	.30	4	4.42	5.29	4	2.25	3.12	6	2.42	3.29
Horse Work	--	--	1.14	.60	--	6.75	8.49	-	1.26	3.00	-	4.84	6.58
Sweet Clover: 5 Farms													
Man Labor	29	1.0	1.14	.50	15	4.59	6.23	7	5.43	7.07	1	3.60	5.24
Horse Work	--	--	2.28	1.00	--	6.48	9.76	-	6.46	9.74	-	3.60	6.88
Wild Hay: 10 Farms													
Man Labor	34	.8	1.07	.60	14	2.40	4.07	12	2.31	3.98	8	3.00	4.67
Horse Work	--	--	2.14	1.20	--	3.55	6.89	-	2.81	6.15	-	4.73	8.07

*Includes Yields of Alfalfa for both Cuttings.

Table XXVI.—UNIT REQUIREMENTS OF WORK HORSES, 1925.

Farm No.	Work Horses	Hours Worked per Horse	Total Grain	Hay	Other Roughage	Pasture	Man	Horse	Shoeing, Veterinary and Medicine	Crop Acreage per Horse
	Number	Hours	Pounds	Pounds	Pounds	Days	Hours	Hours	Dollars	Acres
13	9.5	715	2,890	2,800	266	152	70	2	.21	29.8
10	8.0	740	2,180	914	4,830	230	64	4	---	34.5
6	11.6	525	3,220	3,980	---	68	55	-	---	38.6
14	16.2	664	2,870	2,220	562	160	101	8	1.32	38.5
12	16.8	851	3,580	3,090	722	115	67	3	1.07	32.6
11	13.2	595	2,270	2,660	1,108	191	61	-	.34	27.4
2	8.8	630	2,410	2,410	3,090	77	134	3	---	32.8
19	9.0	780	3,490	4,110	100	84	138	-	---	36.0
3	6.2	958	2,410	5,070	---	108	84	4	1.80	42.1
20	5.8	1,002	4,140	4,130	109	52	98	-	.50	33.3
4	6.0	1,170	3,640	3,880	207	---	102	32	---	48.2
18	6.3	898	2,570	3,110	3,110	183	81	2	1.41	38.7
7	12.0	665	3,160	2,880	788	101	68	3	---	31.5
AVERAGES:										
13 Farms, 1925	10.0	748	2,980	3,045	1,155	123	84	4	.53	34.8
13 Farms, 1926	10.3	654	1,970	2,470	980	175	76	3	.20	33.8

Table XXVII.—UNIT REQUIREMENTS PER MILK COW, 1925.

Farm No.	Cows in Herd	Butterfat Production per Cow	Concentrates				Dry Roughage			Total Concentrates	Total Roughage	Silage	Pasture	Man Labor	Horse Work	Veterinary and Medicine
			Oats	Barley	Corn	Protein Feed	Tame Hay	Other Hay	Other Roughage							
	No.	Lbs.	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Days	Hours	Hrs.	Dollars
13	7.5	121	300	113	30	----	4,050	375	964	443	5,389	----	289	114	2	.85
10	6.6	278	1,213	----	----	----	733	331	8,049	1,213	9,113	----	232	122	1	----
6	9.0	273	717	1,175	----	250	2,690	890	----	2,142	3,580	----	123	104	2	.94
14	18.0	296	1,520	1,565	195	8	1,895	43	1,790	3,288	3,728	----	208	157	1	.13
1	8.7	124	145	----	1,205	----	----	1,312	178	1,350	1,490	----	289	129	1	.55
2	12.3	200	2,410	----	----	----	3,075	651	2,710	2,410	6,436	----	163	140	-	----
19	15.9	307	1,060	953	490	18	3,380	----	965	2,521	4,345	6,370	197	123	3	1.06
20	15.3	288	774	1,455	111	----	1,988	727	887	2,340	3,602	5,540	189	139	1	.94
4	3.2	144	2,270	18	----	----	3,742	----	----	2,288	3,742	----	166	177	-	----
7	7.5	140	293	----	308	----	----	224	5,950	601	6,174	----	241	142	-	1.33
AVGS: 10 farms, 1925 ----	10.4	239	1,085	742	248	26	2,110	442	1,930	2,101	4,482	1,790	206	134	2	.61
10 farms, 1926----	10.8	235	1,385	607	116	23	2,725	720	1,045	2,131	4,490	1,825	183	136	4	.56

Table XXVIII.—UNIT REQUIREMENTS PER ANIMAL UNIT OTHER CATTLE, 1925.

Farm No.	Size of Herd	Beef Produced per A.U	Tame Hay	Other Hay	Other Roughage	Total Grain	Total Roughage	Silage	Whole Milk	Skimmilk	Pasture	Man Labor	Horse Work	Veterinary and Medicine
	A. U.	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Days	Hours	Hours	Dollars
13	6.3	373	2,960	----	1,105	455	4,065	----	39	527	180	28	1	.30
6	2.4	1,495	3,140	----	1,075	1,720	4,215	----	59	1,250	93	83	2	--
14	4.8	1,400	1,380	20	1,970	1,280	3,370	----	----	2,785	218	72	5	--
1	3.5	388	----	558	2,620	100	3,178	----	398	1,550	258	76	2	--
2	3.4	955	2,070	1,180	1,900	1,285	5,240	----	126	4,700	178	99	1	--
19	13.5	1,085	3,505	----	608	797	4,113	5,980	414	----	212	43	-	--
20	8.7	1,015	435	475	1,085	590	1,995	4,760	----	----	163	40	-	--
7	3.7	359	----	16	3,460	16	3,476	----	130	1,170	219	64	1	--
AVERAGES:														
8 Farms 1925	5.8	732	1,970	275	1,430	913	3,675	2,630	256	1,540	194	55	1	.04
8 Farms 1926	5.2	1,000	2,580	860	943	1,100	4,383	2,935	357	1,455	137	78	1	--

Table XXIX.—UNIT REQUIREMENTS PER 100 POUNDS PORK PRODUCED, 1925.

Farm No.	Total Production of Pork	Corn	Small Grain	Protein in Feed	Skimmilk	Pasture	Man Labor	Horse Work	Veterinary and Medicine	Death Loss After Weaning
	Pounds	Pounds	Pounds	Pounds	Pounds	Days	Hours	Hours	Dollars	Pctg.
13	34,825	186	273	[illegible]	34	4	1.1	.1	.21	1
10	6,780	487	203	[illegible]	4	14	2.3	-	.21	15
6	3,360	515	41	15	300	[illegible]	2.5	[illegible]	[illegible]	15
14	32,055	409	144	[illegible]	47	4	2.0	.2	.21	1
12	34,390	215	258	3	18	6	2.2	-	.20	8
1	13,730	226	306	2	136	8	2.5	-	26	5
2	19,671	386	53	[illegible]	212	4	1.9	[illegible]	[illegible]	[illegible]
19	1,225	650	751	16	[illegible]	12	26.9	.7	.16	71
3	12,554	480	90	10	[illegible]	7	1.5	.2	.30	11
20	4,245	462	128	2	[illegible]	5	6.5	[illegible]	.31	2
4	11,075	296	65	1	103	7	2.6	.6	.15	4
18	4,202	172	253	[illegible]	365	11	3.7	.2	[illegible]	9
7	7,837	874	351	[illegible]	175	6	3.5	-	.24	30
AVERAGES:										
13 Farms, 1925	14,281	346	200	2	78	6	2.3	.2	.20	7
13 Farms, 1926	14,564	242	237	8	107	6	2.7	.1	.22	5

Table XXX.—UNIT REQUIREMENTS PER 100 HENS, 1925.

Farm No.	Size of Flock	Production per 100 Hens		Corn	Oats	Barley	Speltz	Other Grain	Total Grain	Commercial Feed	Skimmilk	Man Labor	Horse Work	Veterinary and Medicine
		Eggs	Meat											
	No.	Dozen	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Hours	Hours	Dollars
13	81	535	800	113	1,775	6,410	----	141	8,439	549	115	278	2.5	----
10	128	401	1,550	710	2,840	2,625	2,180	2,560	10,915	234	----	179	--	----
6	178	642	231	267	5,325	159	----	354	6,105	225	558	145	--	----
14	75	514	915	139	906	112	7,790	325	9,272	267	----	752	5.3	----
12	67	480	1,590	790	4,575	2,805	----	694	8,864	149	1,478	970	--	5.97
1	133	214	420	1,630	1,204	1,203	1,185	695	5,917	188	1,530	223	--	.56
2	152	205	104	888	1,872	534	2,565	----	5,859	592	1,192	264	7.9	3.75
19	90	150	444	349	2,345	168	530	408	3,800	333	----	428	1.1	----
3	155	622	309	631	2,365	122	3,522	316	6,956	316	1,465	212	7.2	1.29
20	110	569	375	338	2,840	120	4,190	----	7,488	432	----	349	--	----
4	57	582	230	272	2,525	----	----	3,185	5,982	---	268	288	--	----
18	128	235	737	756	119	480	----	2,600	3,955	16	3,610	126	--	.39
7	88	396	580	1,939	2,615	528	----	----	5,073	170	----	278	--	----
AVERAGES:														
13 Farms, 1925	111	423	577	702	2,462	1,023	1,710	832	6,729	333	897	230	1.7	.90
13 Farms, 1926	100	335	687	954	2,360	592	1,150	897	5,953	325	530	238	2.0	2.52