OKLAHOMA
AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATION
In Cooperation with the United States Department of Agriculture
C. P. BLACKWELL, Director
Stillwater, Oklahoma

SYSTEMS OF FARMING IN OKLAHOMA

No. 1, Wheat Farming in North Central Oklahoma

by

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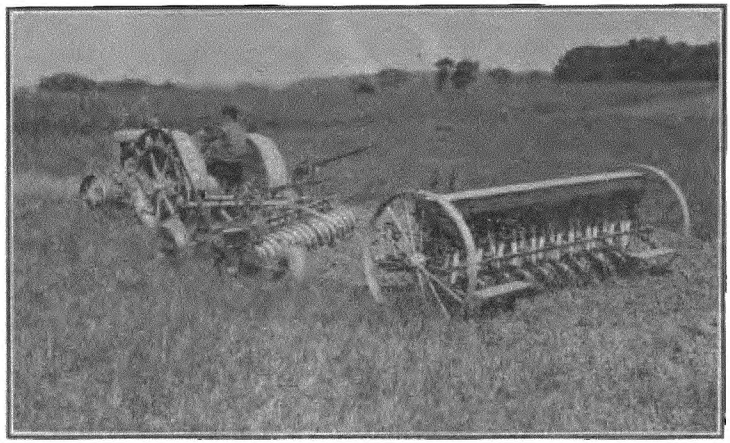

Experiment Station Bulletin 199 April, 1931

CONTENTS

SUMMARY

This bulletin reports the earnings of more than 200 farmers in Garfield and Blaine counties for the crop year 1928 together with an analysis of the factors determining their success or failure.

The best demonstration of what constitutes good farm management is the accomplishment of large numbers of successful farmers under actual farming conditions.

The labor incomes earned on Garfield county farms in 1928 varied from a loss of $1000 to a gain of $5530. The average labor income of all the Garfield county farms was $803. In Blaine county the labor incomes earned showed a similar wide variation and averaged $592.

Large farms earned more than proportionately large incomes. In Garfield county the group of farms raising less than 80 acres of wheat per farm earned labor incomes averaging $126, while the farms raising from 200 to 400 acres of wheat made labor incomes averaging $1584.

The yield of wheat was high in 1928 averaging 18.7 bushels per acre in Garfield county. The farms raising more than 20 bushels of wheat per acre made average labor incomes of $1478, the farms producing less than 16 bushels of wheat per acre made average labor incomes of only $265.

The cost of producing wheat varied from 83 cents per bushel on the farms with the highest yields per acre to $1.45 per bushel on the farms with the smallest acreage of wheat per farm.

An annual gross income of at least one dollar for each dollar of investment in livestock was necessary to show a profit. Low quality, poorly kept livestock was a source of loss on some farms.

An annual gross income amounting to $20 or more per acre was necessary to produce a labor income of $1000 on the average farm. The most profitable group of Blaine county farms had gross receipts amounting to $25.22 per acre and made labor incomes averaging $1489 while the least profitable farms sold products valued at only $8.10 per acre and on the average lacked $346 of paying anything for the farmer's labor.

In Garfield county, the farms using both a tractor and combine made labor incomes averaging $1000 more per farm than the farms using only horse equipment. The power equipped farms raised large acreages of crops per farm and used labor most efficiently.

The farms keeping the largest numbers of dairy cows and chickens earned the largest labor incomes.

The prices of farm products have been low compared with the prices of things farmers buy since the drastic deflation of commodity prices beginning in 1920 Farm prices lag behind retail prices in periods of price change. A stable price level would do much to alleviate the distress of farmers and put farm businesses on a profitable basis.

SYSTEMS OF FARMING IN OKLAHOMA

NO. 1, WHEAT FARMING IN NORTH CENTRAL OKLAHOMA

The best demonstration of what constitutes good farm management is the accomplishment of large numbers of successful farmers under actual farming conditions. The purpose of this investigation is to analyze the farm business on selected farms in order to obtain information as to what systems of farm organization are most profitable, what changes are taking place in the farm business as a result of the introduction of modern power machinery, what practices the better farmers are finding most profitable, and in general to learn how to operate a farm most profitably in the wheat growing areas of the State. The authors of this publication are indebted to the farmers of Blaine and Garfield county whose cooperation in furnishing the basic information made possible the portrayal of the results.

This bulletin is the first of a series of studies made by the Department of Agricultural Economics of Oklahoma Agricultural and Mechanical College concerning systems of farming in Oklahoma. This report deals with business organization and operation of farms in the winter wheat growing areas of the north central portion of the State. Similar studies of other type-of-farming areas in the State will follow.

Method of Study

In the spring of 1929 survey records of the previous year's farm business were obtained through personal interview by representatives from the College staff with farmers in the vicinity of Carrier in Garfield county and Okeene, in Blaine county, Oklahoma. Slightly more than 100 records of the previous year's farm business were obtained in each of the two areas. The records obtained included complete opening and closing inventories, cash receipts and expenses, the amount of labor employed and the value of farm products used by the family. This report is the result of the statistical analysis of these farm records together with pertinent census data, price statistics and other information available at the College.

Areas Studied

The two farming areas selected for this investigation are typical of the best wheat growing areas in North Central Oklahoma. (Figure 1.) The soil in both of these areas was very fertile in its original state. Through continued cropping this past 30 years, mostly to winter wheat, the soil fertility has been depleted to a noticeable extent on some farms. The topography is, for the most part, level or slightly rolling and is well adapted to large scale power machinery farming. An effort was made to select farms following a rather uniform system of farming in which the major crop was winter wheat supplemented with small acreages of feed crops and the production of livestock.

The information presented in this publication is directly applicable to the wheat growing sections of Blaine, Garfield, Alfalfa, Grant, Major, Kingfisher, Woods, Kay, Noble, Logan and Canadian counties[1]. The illustration of the principles of what generally constitutes good farm management afforded by this investigation will be perhaps valuable to farmers elsewhere.

Soil and climatic conditions in the north central portion of the State are favorable to the growing of wheat. The soil is of the Red Prairie type, dark in color and has a rather tight subsoil in some instances. The rainfall averages approximately 30 inches annually and the seasonal distribution of the precipitation fits in well with the growing season of winter wheat. The rainfall is heaviest in the months when the moisture requirements of the

[1]These counties were designed as Area 2 in Types-of-Farming in Oklahoma by J. O. Ellsworth and F. F. Elliott, Oklahoma Experiment Station Bulletin No. 181, June, 1929.

wheat crop are the largest. Considerable variation is experienced in both the seasonal distribution of rainfall and the total annual precipitation. Because of these factors crop yields vary widely from year to year.

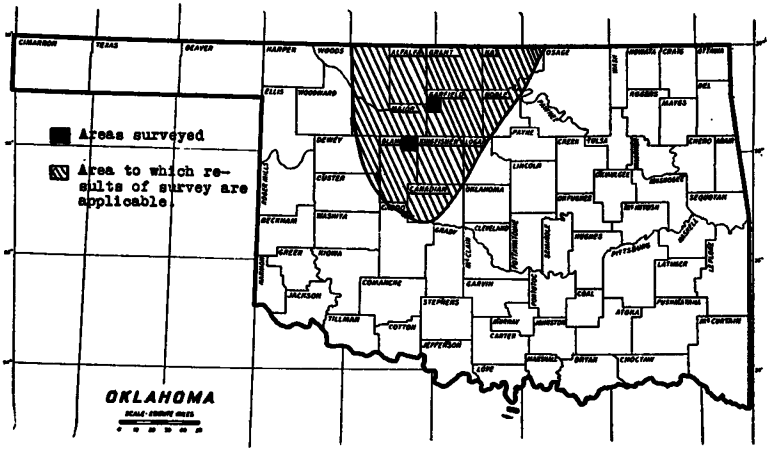

Figure 1—Area to which study applies

Trends in the Organization of Farms

In the years immediately following the settlement of this portion of the State, considerable corn was grown; also much of the land was left in sod and more livestock was raised than at present. (Tables 1 and 2.) Since 1920 the tractor and combine harvester have come into general use in the wheat belt. Topographical and climatic conditions favored the use of these machines in the areas covered by this study. The lower costs of wheat production made possible by the use of the tractor and combine and the profitable prices obtained for wheat during the period 1924 to 1927, together with the distinctly unprofitable prices received for beef cattle and hogs in most of the post-war years has resulted in a radical shift to practically exclusive wheat farming in parts of these areas.

One of the effects of the general use of the tractor and combine that is becoming increasingly apparent with the passage of time is that these machines tend to increase the size of the average farm producing wheat. The most common size of farm in both Garfield and Blaine counties is 160 acres. With the horse farming equipment used in the past, a quarter section of land devoted primarily to wheat and an acreage of feed crops and pasture sufficient to maintain the work stock provided nearly full time employment for a farmer and his family The use of a moderate sized tractor and combine makes it possible for a farmer to handle practically double the acreage that he formerly handled with horses. Furthermore, the economical use of these machines demands that the interest and depreciation charges on this equipment be spread over the maximum acreage if the lowest costs of production are to be realized and large profits are to be made.

Figures obtained in this study indicate that the larger wheat farms are the most profitable. This has been the common knowledge and experience of successful farmers in these areas for some years past. The tendency

Table 1—Number of Farms, Acres of Crops and Number of Livestock per Farm in Garfield County

Year	1910	1920	1925
Number of farms	3,291	3,089	3,049
Crops per Farm	**Acres**	**Acres**	**Acres**
Corn	46	3	10
Oats	16	13	12
Wheat	40	105	84
Kafir and Maize	2	2	4
Hay and Forage	10	13	12
All other Crops	1	1	4
Total Crops	115	137	126
Pasture, roads and waste	82	75	78
Total Land	197	212	204
Animals per Farm	**Number**	**Number**	**Number**
Cattle	11	13	12
Horses	6	6	5
Mules	1	2	2
Hogs	15	4	4
Sheep	--	2	2
Poultry	84	89	110

Source: United States Census of Agriculture 1910, 1920 and 1925.

Table 2—Number of Farms, Acres of Crops and Number of Livestock per Farm in Blaine County

Year	1910	1920	1925
Number of farms	3,291	3,089	3,049
Crops per Farm	**Acres**	**Acres**	**Acres**
Corn	45	22	17
Oats	7	6	6
Wheat	22	70	70
Kafir and Maize	3	8	6
Hay and Forage	6	12	9
Cotton	3	1	8
All other Crops	1	4	2
Total Crops	87	123	118
Pasture, roads and waste	127	134	120
Total Land	214	257	238
Animals per Farm	**Number**	**Number**	**Number**
Cattle	12	15	12
Horses	6	7	5
Mules	1	1	2
Hogs	11	6	5
Sheep	--	2	1
Poultry	58	86	88

Source: United States Census of Agriculture 1910, 1920 and 1925.

towards an increase in the size of farms in this area is already apparent. Land is difficult to rent. Some farmsteads have already been abandoned; many others serve as a country home for the landowner who has retired and who is renting his land out to his neighbors. This increase in the size of farms has led to still another and perhaps more important course of action. In the struggle for larger acreages per farm and the determination of which farmers should be displaced from farming these lands, there has been increased competition for land and a bidding up of the sales price of land, possibly above that justified by its prospective earning capacity. This is a natural result of such competition but it makes increasingly difficult the profitable management of these farms.

Because of the increased investment for both the larger farm acreage necessary for most profitable wheat production and the cost of the machinery necessary for this kind of farming, many farmers in these areas are attempting to meet the situation by changing their systems of farming to those which provide a larger income than wheat on a limited acreage. With most farmers, this attempt to augment the farm income on a small acreage has taken the form of additions or increased numbers of dairy cows and poultry with wheat still remaining a cash crop of considerable importance.

The addition of dairy cows and poultry on wheat farms and the substitution of feed crops for part of the wheat lowers the peak load of labor, but increases the total hours of labor needed on a given farm. This has the effect of lowering the amount of labor hired and increasing the hours of operator and family labor for the year. The net income per hour of labor is usually smaller for these livestock enterprises than it is per hour spent on wheat, but as long as the total net annual income for the farm family is increased an appreciable amount thereby, some farmers will produce these products.

Naturally the trend towards more dairy and poultry production will be hastened by a decline in wheat prices relative to dairy and poultry prices. In view of the recent developments in the use of tractors and combines, and

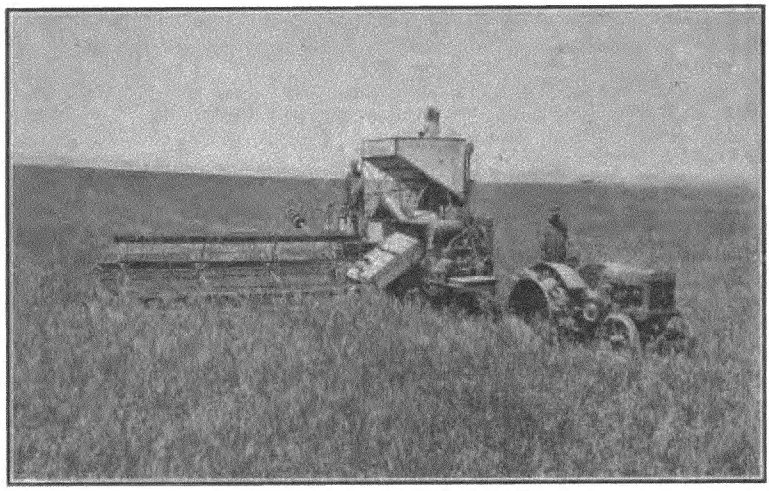

Figure 2—Combining. This two-man outfit can harvest forty acres of wheat each day.

the stimulus which these machines have given to increased wheat production, it seems probable that wheat prices will be lower in the near future compared with dairy or poultry prices than they have been on an average during the past five or six years. The problems of maintaining soil fertility, keeping down weeds, and plant diseases and insects are generally more easily solved under a system of diversified crop and livestock production than under a one-crop system.

Purchasing Power of Butter, Eggs, and Wheat in Oklahoma, 1921-1931

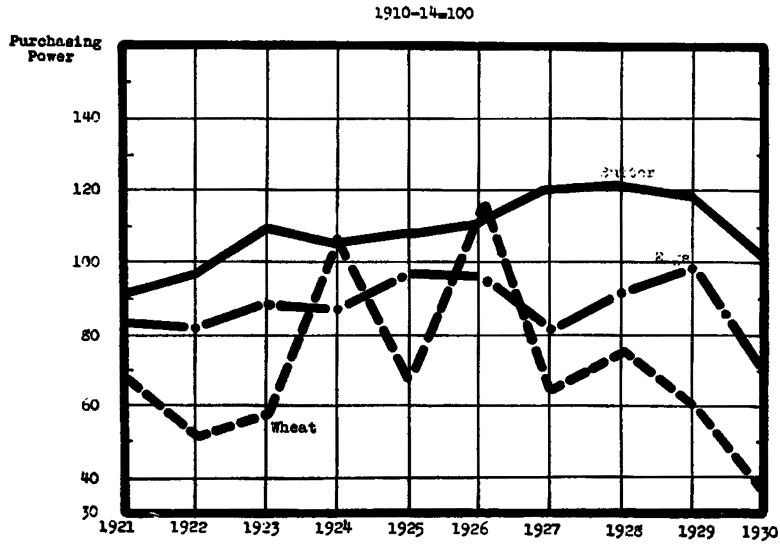

Figure 3—The purchasing power of wheat (acre value basis) has been much more variable and, on the average, lower during the past ten years than that of either eggs or butter. If costs of production have changed proportionately, an increase in purchasing power can be taken as an index of profitableness. The production of dairy and poultry products can be more readily adjusted to changes in demand than annual crops or meat animals.

PART I

PRESENT FARM ORGANIZATIONS IN BLAINE AND GARFIELD COUNTIES

The problem of the farm manager in the organization of a profitable farm business may be stated as that of finding the farm enterprise that pays the largest return per hour of labor, producing a maximum quantity of this product and then fitting in with this enterprise such various supplementary and complementary enterprises as will add most to the income from the farm business. Because much of the labor applied to cash crops is seasonal and limited in extent, such crops must be expected to yield a higher return per hour than farm enterprises that are less exacting as to the time when the labor is needed.

Because of the rapid changes that have been taking place in methods of production and the instability of the prices of farm products in recent years, no one particular system of enterprises supplementary and complementary to the wheat enterprise has become predominant. At the present time a number of side-line enterprises and part-time occupations are engaged in by wheat farmers. Many find temporary employment in lines of business not on farms when they are not busy caring for the wheat crop. Among the 200 farmers interviewed in this investigation were found examples of employment supplemental to wheat production, as livestock buyers, machinery salesmen, grain elevator managers, carpenters, bricklayers, pipe line contractors, and other miscellaneous part-time occupations. Individual preference, initiative, and ability in many instances determine the form which these supplemental occupations will take[2].

PHYSICAL ORGANIZATION

The present average organization of farms for each of the three size groups, 160 acres, 240 acres, and 320 acres are shown in Tables 3 and 4. Because of the lack of uniform organization for farms of various sizes, the average organizations presented here are but rough approximations of the typical or most common systems. In Garfield county from 75 to 80 per cent of the crop land was in wheat on the farms included in this investigation. There was a tendency on the larger farms included in this survey in Garfield county to put a higher percentage of the land in wheat than on the small farms. The larger proportionate feed requirements for work animals and livestock production for home use made it necessary for the smaller farms to devote a slightly larger percentage of the total crop area to feed crops. Approximately two-thirds of all the farms in the Garfield county group had tractors. A larger percentage of small farms were operated with horses than of the large farms, hence the feed requirements were larger proportionately.

In Blaine county approximately 85 per cent of the crop land was in wheat in all the three size groups of farms. Feed crop area tended toward a minimum for the requirements of work stock and the small number of other livestock kept.

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[2]Supplementary enterprises are the enterprises that contribute to the farm income by affording a more economical use of the resources at hand, usually labor, land and equipment. Farm enterprises are said to be complementary when one enterprise aids in or makes a direct contribution towards the production of another. An eminent agricultural economist has stated that—

> "The existence of these complementary and supplementary relations between enterprises constitutes the chief economic reason for diversified farming." Taylor, H. C., Outlines of Agricultural Economics, p. 39. 1925.

Dairying is supplemental to wheat farming in parts of Oklahoma in that it provides profitable employment to the farmer and his family when they are not engaged directly in wheat production. Dairying is complementary to wheat when the keeping of dairy stock provides the means of increasing the yields of wheat and thereby the profits from wheat growing.

Table 3—Physical Organizations of Average 160, 240 and 320 Acre Farms in Garfield County, 1928

Size of Farms	160 Acre Farms	240 Acre Farms	320 Acre Farms
Number of farms	42	10	12
Acres of Crops			
Wheat	85	129	174
Corn	4	3	10
Kafir, Milo, etc.	3	5	6
Oats	8	7	4
Barley		3	
Alfalfa	5	6	10
Wild hay	1	1	1
Sorghum, Forage	4	8	7
Annual Pasture	1	1	1
Garden	1	1	1
Total Crops	112	164	214
Pasture	40	68	86
Waste	2	2	4
Farmstead and roads	6	6	16
Number of Livestock			
Cows	7	10	8
Other cattle	7	4	12
Horses and Mules	4	5	5
Hogs	2	4	4
Sheep	1	10	10
Chickens	103	139	172

Table 4—Physical Organizations of Average 160, 240 and 320 Acre Farms in Blaine County, 1928

Size of Farms	160 Acre Farms	240 Acre Farms	320 Acre Farms
Number of Farms	50	5	13
Acres of Crops			
Wheat	102	151	200
Corn	1		2
Kafir, Milo, etc.	1	1	3
Oats	8	12	12
Barley	3	2	1
Alfalfa	3	6	6
Wild hay	1		1
Sorghum and Forage	2	4	7
Annual Pasture			1
Garden	1	1	1
Total Crops	122	177	234
Pasture	29	53	68
Waste	2		6
Farmstead and roads	7	10	12
Number of Livestock			
Cows	5	5	8
Other Cattle	7	6	10
Horses and Mules	5	5	7
Hogs	4	5	5
Sheep		3	1
Chickens	86	93	83

The area in pasture on most farms was the minimum needed for the livestock kept or land that was too rough or poor for profitable crop production. The area taken up by farmsteads, roads, and waste was proportionate to the size of farms in most instances.

The figures in Tables 3 and 4 indicate that insufficient acreage was devoted to crop production other than wheat to permit any appreciable diversification of the farm business by livestock production on the average farm. Insufficient feed was produced on many farms to meet adequately the feed requirements of the livestock maintained for home use and the farm work animals.

Five head of work stock was the most common number kept on the 160 and 240 acre farms in both Blaine and Garfield counties. One or two additional horses or mules were kept on the 320 acre farms. In addition to these work animals, 58 per cent of the Blaine county farms and 65 per cent of Garfield county farms had tractors as sources of farm power. Considerable numbers of sheep were kept on several Garfield county farms.

It might be expected that the smaller farms where the need for diversification was perhaps greatest would have the largest numbers of productive livestock and a considerably larger percentage of the crop land in feed crops. The figures in the above tables on the average farm organizations for the various sized farms do not show this tendency at all in Blaine county, and only to a slight extent in Garfield county. One factor that may explain part of this uniformity of organization is that the quality and price of the productive livestock raised, and the price of the livestock products produced on most of these farms was such, in 1928 and during the preceding five years, that reducing the proportion of the land in wheat did not usually result in an increase of the net income from the farm business. Wheat prices during the five years previous to this study had averaged $1.25 per bushel for the State as a whole. This was high relative to the prices of other farm products and tended to encourage wheat production to the exclusion of other farm enterprises in this area.

Physical Organizations on Tractor and Horse Equipped Farms

The 52 farms in Garfield county which had tractors averaged 272 acres per farm compared with 208 acres on the 54 farms that did not have tractors. In Blaine county 47 farms were equipped with tractors. The average size of these was 243 acres compared with an average of 203 acres for the 63 farms that did not have tractors. (Tables 5 and 6.) The tractor farms in Garfield county had a slightly larger percentage of their area in wheat than the non-tractor farms (57.4% compared with 52.0%), and a smaller percentage in pasture. Blaine county had practically the same proportion of wheat, feed crops and pasture on the tractor farms as the non-tractor farms.

The number of horses and mules averaged the same per farm for both groups in Garfield county. Blaine county averaged one less work animal per farm in the tractor group than in the non-tractor group. The crop acres per work animal, therefore, were approximately one-third to one-half higher on the tractor farms than on the non-tractor farms. Where tractors are used, most of the heavy work is done with them so that a lower grade of horses can be kept and less grain is needed to keep them in good condition than when horses have to furnish all of the power for field work.

The other livestock, when reduced to the common base of animal units per 100 acres of farm land, showed no significant differences in the average of the two groups in each county[3].

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[3]An animal unit is considered as equal to 1 cow, 1 horse, 2 young cattle, 10 pigs, 14 lambs, 2 colts, 5 hogs, 7 sheep, or 100 chickens. Animals kept for direct production purposes are classified as productive animal units. The latter term does not include work horses or mules.

Table 5—Difference in Average Organization of Tractor and Horse Equipped Farms, 106 Garfield County Farms, 1928

Kind of Farms	Tractor		Non-Tractor	
Number of Farms	52		54	
Use of Land	Acres per Farm	Per Cent	Acres per Farm	Per Cent
Wheat	156	57.4	108	52.0
Feed Crops	39	14.4	31	14.9
Pasture	66	24.2	60	28.9
Roads, waste, etc.	11	4.0	9	4.2
Total Acres	272	100.0	208	100.0
Livestock	Number per Farm	Animal Units	Number per Farm	Animal Units
Cows	8	8.0	7	7.0
Other Cattle	12	6.0	8	4.0
Horses and Mules	5	5.0	5	5.0
Hogs	6	1.2	4	.8
Sheep	13	1.9	3	.4
Chickens	122	1.2	106	1.1
Total animal units		23.3		18.3
Productive animal units per 100 acres	6.7		6.4	
Crop acres per horse	39.0		27.8	

Table 6—Differences in Average Organization of Tractor and Horse Equipped Farms, 110 Blaine County Farms, 1928

Kind of Farms	Tractor		Non-Tractor	
Number of Farms	47		63	
Use of Land	Acres per Farm	Per Cent	Acres per Farm	Per Cent
Wheat	159	65.4	129	63.6
Feed Crops	27	11.1	23	11.3
Pasture	48	19.8	40	19.7
Roads, wastes, etc.	9	3.7	11	5.4
Total acres	243	100.0	203	100.0
Livestock	Number per Farm	Animal Units	Number per Farm	Animal Units
Cows	6	6.0	6	6.0
Other Cattle	8	4.0	7	3.5
Horses and Mules	5	5.0	6	6.0
Hogs	4	0.8	5	1.0
Sheep	2	0.3	2	0.3
Chickens	95	1.0	86	0.9
Total animal units		17.1		17.7
Productive animal units per 100 acres	5.0		5.8	
Crop acres per horse	37.2		25.3	

FINANCIAL ORGANIZATION

The average total investment per acre of the Garfield county farms is approximately $100 for each group shown in Table 7. The proportion that land and buildings make up of the total investment remains fairly constant —82 to 83 per cent—for each size group, but the proportion invested in land increases from 65.3 per cent on the 160 acre farms to 71.6 per cent on the 320 acre farms. The proportion invested in buildings decreases from 18.1 per cent on the 160 acre farms to 11.5 per cent on the 320 acre farms. There is a tendency to value the land at a higher rate per acre as the size of the farms increases.

Table 7—Financial Organization of Farms, Garfield County, 1928

Size of Farms, Acres	160		240		320	
Number of farms	42		10		12	
	Value	Per Cent of total investment	Value	Per Cent of total investment	Value	Per Cent of total investment
Land	$10422	65.3%	$17893	67.3%	$23618	71.6%
Buildings	2895	18.1	4036	15.2	3789	11.5
Livestock	951	6.0	1353	5.1	1470	4.5
Machinery and Equipment	863	5.4	2093	7.9	2255	6.8
Crops and Supplies	824	5.2	1189	4.5	1830	5.6
Total Investment	$15955	100.0	$26564	100.0	$32962	100.0

The investment in machinery and equipment included the values of tractor, truck, automobile, combine, other farm machinery, small tools, and harness. The investment in farm equipment on the 160 acre farms was small as a rule. Only 48 per cent of these farms had tractors, while 55 per cent of the 240 acre farms, and all of the 320 acre farms had tractors. The percentage of farms having combines was 12, 36, and 42 respectively for the 160, 240 and 320 acre farms. There was an average of more than one automobile per farm.

The financial organization of Blaine county farms in terms of percentages was similar to that of Garfield county farms, but the investment per acre was considerably lower in the Blaine county group. (Table 8.) Real estate values ranged from $60 to $100 per acre compared with $75 to $125 per acre in Garfield county. The investment in buildings was also generally lower and less livestock was kept on the Blaine county farms. The total investment per acre was $82.00 on the 160 acre farms, $76.00 on the 240 acre farms and $78.00 on the 320 acre farms.

Table 8—Financial Organization of Farms, Blaine County, 1928

Size of Farms, Acres	160		240		320	
Number of farms	50		5		13	
	Value	Per Cent of total investment	Value	Per Cent of total investment	Value	Per Cent of total investment
Land	$8892	67.7%	$12423	68.0%	$18797	74.9%
Buildings	1860	14.1	2310	12.6	2358	9.4
Livestock	713	5.4	979	5.4	1396	5.6
Machinery and Equipment	984	7.5	1512	8.3	1441	5.7
Crops and Supplies	693	5.3	1032	5.7	1103	4.4
Total Investment	$13142	100.0	$18256	100.0	$25095	100.0

SUMMARY OF INCOMES AND EXPENSES

Incomes: Wheat is the main source of income for farms in northwestern Oklahoma. Sales of other crops are comparatively unimportant. Crop sales make up from 55 to 60 per cent of the total incomes in Garfield county, and from 60 to 65 per cent of the total incomes in Blaine county. (Tables 9 and 10.) Garfield county farms obtain materially greater incomes from livestock and livestock products than Blaine county farms as is shown by Tables 9 and 10. Thus in the 160 acre farm group in Garfield county the livestock and livestock products amount to $859 (37.6 per cent of the total), while the same sized group in Blaine county had an income per farm of $505 (24.2 per cent of the total) from the same sources.

The increase in inventory shown in several groups occurs when the value of the livestock, crops and supplies, machinery, and buildings on hand at the end of the year is greater than at the beginning.

The gross income per farm in each group increases approximately in proportion to the increase in acreage[1]. Thus in Garfield county the average 160 acre farm had a gross income of $2285; the average 240 acre farm, $3627, and the average 320 acre farm had a gross income of $4489. In Blaine county the gross incomes on the 160, 240, and 320 acre farms were $2082, $3019, and $4149 respectively. In the Garfield area each group average is close to $14 gross income per acre. In Blaine county each group average is close to $13 gross income per acre.

Expenses: Total expenses per acre tend to decrease as the farm area increases. The average total expenses of the group of 160 acre farms in Garfield county is $1146 and for the 320 acre farms it is $1682, or $7.16 and $5.26 per acre respectively. In Blaine county total expenses on the 160 acre farms amount to $1007 per farm and on the 320 acre farms they are $1770, or $6.29 and $5.51 per acre respectively.

Stationary threshing is still practiced to some extent, especially on the smaller farms. The item for combining refers to combining hired, and not to the cost where a combine is owned. It is interesting to note that the labor hired is less than $100 per farm in four out of the six groups of farms. In each group it is less than the estimated value of the family labor although the family labor does not include the value of the farmer's own labor.

Decrease in inventory appears in the expenses of each group of farms where no increase in inventory is shown under income, and occurs when the value of livestock, crops and supplies, machinery, and buildings on hand at the end of the year is less than at the beginning.

Miscellaneous expenses include cash rent, which was paid on a small number of farms, telephone, veterinary, trucking, and other minor items.

Net Farm Income: This is obtained by subtracting total expenses from gross income. The average net farm income increases consistently with the farm area. Garfield county 160 acre farms have an average net farm income of $1149 or $7.18 per acre and the 320 acre farms have an average net farm income of $2807 or $8.77 per acre. Blaine county farms of 160 acres show an average net farm income of $1075 or $6.72 per acre, compared with $2379 or $7.43 per acre for the 320 acre farms.

It should be noted that the crop year of 1928 in northwestern Oklahoma was blessed with higher wheat yields and prices than have been obtained since. However, even with yields and prices so low that the gross income would be reduced to one-half of the 1928 gross income, the larger farms would still show the higher average net incomes.

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[1]This does not include the value of farm products used by the farm family.

Table 9—Summary of Incomes and Expenses per Farm
Garfield County, 1928

Size of Farms, Acres	160	240	320
Number of farms	42	10	12
Income:			
Crops sold	$1253	$2145	$2706
Livestock sold	387	556	461
Cream and milk sold	364	510	500
Eggs sold	108	253	255
Machine hire	32	99	50
Labor off the farm	45	51	30
Trucking	29	--	9
Increase in inventory	15	--	400
Miscellaneous	52	13	78
Gross Income	$2285	$3627	$4489
Expenses:			
Livestock purchased	$97	$160	$176
Repairs			
Buildings	21	8	56
Machinery	41	49	59
Fences	16	24	40
Auto repairs	51	28	66
Gas and oil	136	132	211
Threshing	210	76	156
Combining	33		92
Twine	13	13	4
Seed	11	24	14
Feed (purchased)	126	117	95
Taxes	135	249	293
Insurance	43	51	78
Labor:			
Hired	61	103	71
Family	68	140	220
Decrease in inventory	--	241	
Miscellaneous	84	103	51
Total	$1146	$1518	$1682
Net farm income	$1139	$2109	$2807
Interest charge at 5%	798	1328	1648
Labor income	341	781	1159
Rate earned on investment	3.6	5.7	6.8

Table 10—Summary of Income and Expenses per Farm
Blaine County, 1928

Size of Farms, Acres	160	240	320
Number of farms	50	5	13
Income:			
Crops sold	$1359	$1886	$2527
Livestock sold	257	589	285
Cream and milk sold	159	200	582
Eggs sold	89	94	105
Machine hire	52	160	116
Labor off the farm	150	26	46
Trucking	2	24	--
Increase in inventory	--	--	453
Miscellaneous	14	40	35
Gross Income - - -	$2082	$3019	$4149
Expenses:			
Livestock purchases	58	243	74
Repairs			
Buildings	22	8	21
Machinery	46	59	57
Fences	15		13
Auto repairs	51	30	52
Gas and oil	140	168	223
Threshing	108	202	65
Combining	87	110	107
Twine	15	24	45
Seed	13	26	25
Feed (purchased)	89	119	225
Taxes	114	146	187
Insurance	16	19	12
Labor			
Hired	55	35	184
Family	90	114	258
Decrease in inventory	41	6	
Miscellaneous	47	63	122
Total - - - -	$1007	$1372	$1770
Net farm income	1075	1647	2379
Interest charge at 5%	657	913	1240
Labor income	418	734	1139
Rate earned on investment	4.1	6.3	7.4

Labor Income: If we allow five per cent for the use of capital on the valuation shown in Tables 7 and 8, and deduct this from the net farm income we obtain the labor income of the farmer. In addition to this he has the use of a house and farm products for his family. Labor income is a convenient measure of a farmer's ability as a laborer and manager. An arbitary deduction of five per cent for the use of all capital is made instead of deducting the varying amounts of interest that actually have to be paid by each farmer. Hence those who own their farms and those who pay interest are tested by a measure which is practically independent of the capital they own.

Under the conditions prevailing in 1928 the labor income goes up decidedly on the larger farms. Garfield county farms of 160, 240, and 320 acres have labor incomes of $341, $781, and $1159 respectively. Blaine county labor incomes average $418, $734, and $1139 respectively for the same sized farms.

Rate Earned on Investment: Another measure of the farmer's ability is to allow a fair deduction from net farm income for the farmer's labor, and calculate what per cent the remainder is of the total investment. The average rate earned on the investment by the different farm groups increases consistently with the farm area. The rates for Garfield county are 3.6, 5.7, and 6.8 per cent, and 4.1, 6.3, and 7.4 per cent for Blaine county for the 160, 240 and 320 acre farms respectively.

DISTRIBUTION OF INCOME

Approximately two-thirds of the total farm receipts on the various sized farms in Blaine and Garfield counties were derived from the sales of wheat. The larger farms tended to have a slightly larger proportion of the total receipts from wheat than was evidenced on the smaller farms. Sales from crops other than wheat were very small on most farms, in fact they were insufficient to counterbalance the feed purchased on the average farm.

The sales of livestock were strikingly uniform on the various sized farms, averaging from 10 to 17 per cent of the total receipts. Sales of cattle amounted to from six to nine per cent of the total in the various sized farm groups. Receipts from hogs were small on most farms. Sales of live poultry made up from three to five per cent of the total gross sales except in the group of 320 acre farms in Garfield county.

Sales of milk and cream were second in importance only to wheat on a large majority of farms, usually making up from 10 to 15 per cent of the total. There was a notable tendency for the percentage of sales from milk and cream to decline as the size of farms increased in Garfield county. In Blaine county the average sales of milk and cream increased as the size of farm increased in the various groups.

The receipts from the sale of eggs were roughly one-half the amount of the sales from milk and cream on a majority of farms, and averaged slightly more than five per cent of the receipts in Garfield county and three per cent in Blaine county. Labor off the farm and machine hire were considerable items particularly on the 160 acre farms, indicating that the operators of these farms were finding it necessary to seek outside employment to increase their income.

In general it can be stated that the 160 acre farms were more diversified as a rule than the 240 and 320 acre farms. More of the total income was derived from the intensive livestock, dairy cattle and poultry on the small farms while on the large farms wheat and beef cattle were the more important sources of income.

Table 11—Distribution of Receipts on 160, 240 and 320 Acre Farms in Blaine County, 1928

Size of Farm, Acres	160	240	320
Number of Farms	50	5	13
Crops	Per Cent	Per Cent	Per Cent
Wheat	63.3	67.1	63.4
Other Crops	2.3	--	2.8
Total Crops	65.6	67.1	66.2
Livestock			
Cattle	7.0	5.9	8.3
Hogs	2.7	6.0	1.5
Poultry	4.6	4.9	3.1
Total Livestock	14.3	16.8	12.9
Miscellaneous			
Milk and Cream	7.0	8.4	14.0
Eggs	3.9	2.9	2.5
Labor and Machine Hire	9.2	4.8	4.4
Total Miscellaneous	20.1	16.1	20.9
Total Income	100.0	100.0	100.0

Table 12—Distribution of Receipts on 160, 240 and 320 Acre Farms in Garfield County, 1928

Size of Farm, Acres	160	240	320
Number of Farms	42	10	12
Crops	Per Cent	Per Cent	Per Cent
Wheat	58.9	62.5	69.9
Other Crops	.8	--	1.5
Total Crops	59.7	62.5	71.4
Livestock			
Cattle	7.3	8.7	7.2
Hogs	3.3	1.6	1.0
Poultry	4.2	3.7	1.8
Total Livestock	14.8	14.0	10.0
Miscellaneous			
Milk and Cream	14.6	13.2	10.2
Eggs	4.8	6.2	5.2
Labor and Machine Hire	6.1	4.1	3.2
Total Miscellaneous	25.5	23.5	18.6
Total Income	100.0	100.0	100.0

FARM PRODUCTS USED IN THE HOME, SHELTER, AND OTHER PERQUISITES FURNISHED BY THE FARM BUSINESS

Farm products used in the home, shelter, use of automobile or driving horses, telephone service, and fuel were important contributions of the farm business towards the family living. On the 160 acre farms the average value at wholesale prices of farm products used in the home amounted to slightly more than $200.00 in both Garfield and Blaine counties. The largest value of farm raised food products, $277.55, was consumed on the 320 acre Blaine county farms.

The larger and more prosperous farm businesses furnished more farm products and a larger value in shelter than the smaller farm businesses. (Tables 13 and 14.) Slightly more labor, both family and hired, was employed on the larger farms, hence there was a need for larger amounts of food and shelter; however, the larger cash incomes made on the large farms were the basis for this higher standard of living in most instances. Considerable variation occurred between farms and between various size groups in the amount of specific farm products consumed by the farm family. Dairy and poultry products made up more than one-half of the total value of food products consumed on the farms in all the size groups. On only an occasional farm was a beef animal or sheep killed and consumed at home.

The average value of a farm dwelling on a 160 acre farm in Blaine county was found to be $1100. In Garfield county the value of farm dwellings was higher than in Blaine county, and increased appreciably as the size of farms increased. The annual value of the farm house was computed as 10 per cent of the present value. This charge includes the costs of interest on the investment, depreciation, insurance, taxes and repairs.

No attempt was made to separate the portions of expense arising from the use of automobiles, driving horses and telephone between the farm business and the personal affairs of the farmer. The automobile expense was a considerable item on many farms though justified where its use was largely for business purposes. The automobile is the greatest time saving machine on the farm and is a necessity for the farmer whose time is valuable.

Table 13—Value of Farm Products Used in the Home and Shelter Furnished by the Farm Business*, Garfield County, 1928

Size of Farms, Acres	160	240	320
Number of farms	42	10	12
Beef and mutton	$ 2.93	$ 5.00	$ 5.83
Pork	23.57	37.80	12.92
Chickens	33.93	45.70	55.33
Eggs	38.81	38.50	42.67
Milk, cream and butter	65.71	73.00	51.75
Garden, orchard and potatoes	44.73	53.70	71.67
Total farm products used in the home	$209.68	$253.70	$240.17
Shelter, 10 per cent of value of dwelling	145.00	165.00	200.00
Total	$354.68	$418.70	$440.17

*In addition, the farm business furnished for personal use an automobile or driving horses, telephone service and some fuel, the value of which were not determined.

Table 14—Value of Farm Products Used in the Home and Shelter Furnished by the Farm Business*, Blaine County, 1928

Size of Farm, Acres	160	240	320
Number of farms	50	5	13
Beef and mutton	$ 2.30	$ 6.00	$ 2.31
Pork	23.10	16.00	25.46
Chickens	42.62	67.60	61.46
Eggs	34.60	34.20	44.38
Milk, cream and butter	55.94	61.40	71.31
Garden, orchard and potatoes	44.20	47.00	72.63
Total farm products used in the home	$202.76	$232.20	$277.55
Shelter, 10 per cent of value of dwelling	110.00	116.00	130.00
Total	$312.76	$348.20	$407.55

*In addition, the farm business furnished for personal use an automobile or driving horses, telephone service and some fuel, the value of which were not determined.

If it were possible to arrive at an accurate value of all of the various products and services furnished by the farm towards the family living, the total would vary between $500 and $1000 on a majority of these farms. These amounts are incomes, not received in cash, in addition to the labor incomes and interest earned on the owned portion of the farm business indicated in Tables 9 and 10. These incomes were larger and permitted a higher standard of living than that of a majority of farmers in most years.

PART II

FACTORS OF FARM MANAGEMENT SUCCESS

As a means of determining what were the important factors of success on wheat farms the records from the Blaine and Garfield county farms were each grouped, first, according to the labor incomes made by the farm operators, and second, by the rates of interest earned on the farm investments. The results of these groupings for the 106 Garfield county farms are shown in Tables 15 and 16. Twenty-five of the 106 Garfield county farmers made minus labor incomes, 23 from $1 to $499, 22 from $500 to $999, 23 from $1000 to $1999, and 13 made labor incomes of $2000 or more. The most important factor brought out in Table 15 is, first, that the farms on which minus labor incomes were made were larger than the farms making incomes from $1 to $1000 though smaller than the average of all the farms; second, that on the farms making plus labor incomes there was a very close correlation between size of business, measured in either acres of wheat, acres of land per farm, or number of productive animal units per farm and labor income. Rates of production as indicated by the yield of wheat per acre were also closely associated with labor income. The fact that the farms showing the largest losses were larger in acreage than the groups making small plus incomes is significant and yet easily explainable. When the farm income is insufficient to meet expenses either because of poor management or inescapable loss from natural causes, the larger the farm business the larger the loss is likely to be. The larger than average farm businesses were the more profitable, but they also had the possibility of large losses in event of a crop failure or other disaster.

Table 15—Farms Grouped According to Labor Incomes, 106 Garfield County Farms, 1928

Number of Farms	Range in Labor Incomes	Acres in Wheat	Yield of Wht (bu.)	Acres in Farm	Prod. Animal Units	Total Farm Inventory	Total Farm Receipts	Average Labor Income	Rate Earned Per Cent
	Dollars					Dollars	Dollars	Dollars	
25	1000-0	120	16.1	228	14.9	23017	3102	-358	0.7
23	0-499	105	17.6	188	11.9	19367	3153	312	3.5
22	500-999	110	18.7	218	14.1	21115	3436	695	5.6
23	1000-1999	148	19.7	249	14.8	25790	5665	1433	8.4
13	2000-5530	202	22.2	369	23.4	37813	8527	2973	10.9

The profitable farms kept more livestock, raised more acres of wheat, and secured higher yields per acre than the unprofitable farms. The largest losses were sustained where a large business was poorly managed.

Grouping the farms according to the rates of interest earned on the average investment per farm brought out the fact that the most efficient farm organization was not necessarily the largest farm business. In Table 16 the various measures of size of business, acres of wheat, acres in the farm and number of productive animal units per farm increased quite uniformly until the last group, the farms making a rate earned on the farm investment of 10 per cent or more, was reached. The farms in this group averaged slightly smaller in size than the group immediately preceding. These facts while not conclusive, would indicate that something like the optimum size for a one-man farm business in this area was reached at

150 acres of wheat and 280 acres in the total farm. Such a farm business usually provides for an efficient utilization of the labor of one man and his family.

Table 16—Farms Grouped According to the Rate of Interest Earned on the Farm Investment, 106 Garfield County Farms, 1928

Number of Farms	Range in Rate Earned	Acres in Wheat	Yield of Wht (bu.)	Acres in Farm	Prod. Animal Units	Average Farm Inventory	Total Farm Receipts	Labor Income	Average Rate Earned
	Per cent					Dollars	Dollars	Dollars	Per cent
14	-10.0-0	97	15.5	184	11.8	18491	2136	-679	-2.2
17	0-2.9	102	17.6	196	14.5	15059	2963	-138	2.0
20	3.0-4.5	131	17.0	233	13.5	23458	3906	268	3.7
20	5.6-6.9	120	18.8	240	14.8	24161	3845	740	5.6
21	7.0-9.9	173	20.0	286	18.0	29087	6367	1553	8.2
15	10.0-20.0	151	22.1	282	17.4	28126	6862	2646	12.3
Average		131	18.7	240	15.1	24300	4410	803	5.9

The farms making the highest average rate earned on the farm investment were above the average in acres of wheat, number of animals, and total inventory but were not largest farms.

The variations in farm organization on farms earning various incomes presented in Tables 15 and 16 are significant, not because they show to what extent the variations in organization are associated with variations in earnings, but that variations are present. The fact that the more profitable farms had larger than average yields and acreages of wheat does not show to what extent these factors are associated with variations in income. These two tables show results, not causes, of variations in farm earnings. Profitable farms usually have good homes but a good house does not make a farm profitable. The tables point out some of the factors, further analysis of which may lead to a determination of what constitutes a profitable farm business and of the causes of variation in farm earnings.

This analysis of the factors of farming success will be centered around five measures:

I. Size of business
II. Rates of production
III. Efficiency of operation
IV. Balance of business
V. Price relationships

I. SIZE OF BUSINESS

Size of business is an important factor in farming success primarily because increasing the size of the average farm business usually increases the efficiency and utilization of the factors of production. Larger than average farms usually permit the profitable use of more machinery and farm equipment and at a lower cost per acre, the labor force is more nearly utilized to its full capacity, a larger percentage of the total farm investment is in the directly productive enterprises, and a smaller percentage in the overhead items of buildings and equipment. Larger than average farms are usually more efficient in operation than smaller farms; more acres of crops are produced per man employed or per horse or tractor horse power used.

It is not possible to increase the size of farm indefinitely and maintain this increasing rate of efficiency. A point is reached in acreage and the capacity of most farm equipment where further increases in acreage require duplication of much of the equipment. However, on farms where the labor requirements are satisfied by that of the farmer, his family and perhaps small amounts of hired labor in the harvesting season, the larger farm is more efficient in operation and the utilization of the farm resources.

A basic reason for the large importance of the measure, size of business, in this investigation is perhaps due to the fact that in the rapid evolution of farm organizations in the wheat belt to fit the requirements of the tractor and combine, there has been a considerable lag in adjustment. The introduction of labor saving equipment on many farms has not been concurrent with an increase in the size of the farm business. Such farms are at a disadvantage when compared with farms on which the adjustment between size and modern equipment has been made Also size of business is an index, in some instances, of the extent to which labor saving equipment has been introduced. Size of business is an important factor of farming success not only on wheat farms but on a large variety of farming types particularly cotton, poultry and dairy farms. Variations in size of business are usually closely associated with variations in the efficiency of utilization of labor and overhead investment.

Table 17—Farms Grouped According to Acres of Wheat Raised per Farm Garfield County, 1928

Number of Farms	Acres in Wheat		Wheat Yield per Acre	Acres in Farm	Prod. Animal Units	Average Farm Inventory	Total Farm Receipts	Labor Income	Rate Earned Per Cent
	Range	Average				Dollars	Dollars	Dollars	
16	29-79	64	19.5	153	13.1	16125	2834	126	2.0
29	80-104	91	17.6	172	11.2	17464	2561	378	3.8
23	105-149	119	17.7	225	13.9	21162	3868	461	4.6
21	150-199	175	20.9	282	14.8	32037	5736	1338	7.2
15	200-400	251	18.4	407	22.8	3958	8033	1584	7.4

Labor incomes increased more than proportionately with increases in the acres of wheat raised per farm. The yield of wheat per acre was not closely associated with the number of acres. The labor income is computed allowing five per cent on farm investment and rate earned is computed allowing $600 for value of operator's labor.

Grouping the Garfield county farms according to the acres of wheat raised per farm (Table 17) disclosed the fact that the farmers raising less than 150 acres of wheat per farm made labor incomes averaging less than hired man's wages. The group of 21 farmers raising between 150 to 199 acres of wheat per farm made labor incomes averaging $1338, while the 15 farmers raising from 200 to 400 acres of wheat per farm made labor incomes averaging $1584. The relatively small average increase in net return of the latter group over that of the former indicates that the 150 to 199 acre group was making efficient use of its equipment and labor and was approaching the optimum combination on one-man farms.

The yields of wheat per acre were not closely associated with the number of acres of wheat per farm. The number of farms in each of the size groups is probably insufficient to equalize chance variations in yields on

individual farms; there are no significant differences in methods or intensity of cultivation between farms of the various size groups to account for the variations in yields. The smaller farms in this area do not cultivate more intensively or produce more wheat per acre as some advocates of intensive farms have indicated as profitable. Instead, the advantage of high yield per acre lay with the larger farms.

Table 18—Farms Grouped According to Amount of Gross Receipts per Farm, 110 Blaine County Farms, 1928

Number of Farms	Gross Receipts per Farm		Acres of Wheat	Yield of Wheat	Prod. Animal Units	Cash Expense per Farm	Average Farm Inventory	Labor Income
	Range	Average						
	Dollars	Dollars				Dollars	Dollars	Dollars
26	870-1999	1481	95	13	7.8	1012	12981	-181
29	2000-2999	2469	124	13	10.0	1521	13911	258
30	3000-3999	3466	154	16	11.3	1789	20086	672
30	4000-8500	5560	183	16	14.6	2880	25436	1409

A farmer has to sell over $4000 worth of products from his farm each year in order to make a good income. It is easier to make a large income by increasing the volume of the business than to further decrease the expenses on most farms.

Volume of gross receipts per farm is not a particularly satisfactory measure of farming success. However, it does serve to point out one important aspect. Gross receipts per farm are the result of a combination of the factors of size of business, rates of production and chance occurrences affecting the total output. Nevertheless, a grouping of the farms in this investigation according to volume of gross receipts does serve to emphasize the point that the relationship between gross receipts and labor income is of necessity close, and further that, as wheat farms are usually operated, a minimum of $4000 to $5000 in gross sales per farm is necessary before the operator can reasonably expect a satisfactory return for his own labor. (Table 18.) A basic reason back of this seemingly large figure for a minimum of gross receipts can be explained as follows: The rental or interest charge for the use of land usually amounts to one-third of the gross income, another third is usually taken up by the operating and power costs, leaving one-third as a return for the labor spent in production. This is only a rough approximation of the most common division of expense for the farming system as a whole, and does not apply to the distribution of expense with specific enterprises. After the necessary and incidental family and hired labor is paid for out of this latter one-third of the gross receipts, the residual amount left as pay for the farmer's own labor is small, if the share is small at the outset.

Corporation Farming

Much has been said and written in recent years concerning the possibility of corporation farming. Some people have taken the adjustments in the size of farms to modern equipment needs as indications of the decay of the system of farming followed in the past—the family farm. The present trend toward increased acreage of the average farm has no such connotation in fact. The increased investment in equipment and land which results from the use of modern equipment, to be sure, increases the capital requirements necessary for a successful farm organization. Also the larger investment and more commercialized type of farming call for a higher degree of managerial ability than was required by the smaller investment and more self-sufficing type of farming common in earlier days.

On the other hand, the increasing amount of cooperation among farmers in securing the services of experts and in buying and selling has the effect of securing for individual farmers many of the advantages of large scale corporation farming and still retaining the advantages of personal interest and mobility of labor. The seasonal nature of agricultural production, its dependence on the weather, the importance of personal interest when dealing with living plants and animals, and the large areas over which the supervision of labor must of necessity be spread makes agriculture an industry which does not readily lend itself to factory methods of production with its close supervision of large numbers of laborers. The extension services of the state agricultural colleges are supplying, through the county agricultural agents, home demonstration agents, and extension specialists many of the advantages of the highly trained experts possible under a system of large scale farming. The Federal Land Bank is a cooperative movement of farmers under governmental supervision and direction to secure long term farm credit at reasonable rates of interest. Numerous cooperative buying and selling agencies of farmers now secure for their members the advantages of buying and selling in large quantities. The processing of farm products as illustrated by cooperative elevators, gins, fruit packing houses, and creameries, the keeping of farm accounts and many other services are now being successfully accomplished by groups of farmers working cooperatively.

In certain lines of agricultural production the advantage of large scale operation under corporate or individual management may, at some future time, prove most profitable. Where such large scale farming is profitable it is advantageous both to the owner of capital and the employees. The ownership of stock in a farming corporation that is returning reasonable rates of interest is preferable to owning a profitless individual farm. The well trained farmer on a farm of adequate size and equipment with modern machinery has little to fear either from competition of corporation farms or the unskilled farmers using less modern equipment in foreign countries. The most severe competition is between one farmer and his neighbor as to which can so organize and operate his farming business most efficiently as to produce at the lowest possible cost.

II. RATES OF PRODUCTION

Grouping farms according to yields per acre or production per animal has an inherent bias in it. Such a grouping has the disadvantage of being a result, not a direct cause. A high yield per acre may not be entirely due to the method of culture used, the variety of seed planted, or other controlled factor. Sorting farms on the basis of yield throws the farms where the natural conditions, soil and climate, were particularly favorable into the high yield groups. Only to the extent that variations in yield are the result of controlled differences in production methods are yield data of value in determining what are the most profitable rates of production. With this limitation in mind, the figures in Table 19 indicate the tendency rather than the absolute effect that yield per acre has in determining the most profitable intensity of cultivation.

Yields of Wheat

The yields of wheat per acre on the Garfield county farms analyzed in this study were high in 1928, averaging 18.7 bushels per acre. On the farms where yields of from 10 to 15 bushels of wheat per acre were produced, the average labor income was $265 and the average rate earned 3.3 per cent. (Table 19.) Among the group of farms where the yield of wheat per acre varied between 21 and 40 bushels and averaged 24 bushels per acre, the average labor income was $1478 and the average rate earned was 7.7 per cent. The intermediate yield groups showed proportionate earnings. It is

worthy of note that the highest average yield per acre was obtained by the group of farms raising the largest acreage of wheat per farm.

The importance of high yields per acre of wheat is well illustrated by differences in labor income and rate earned in the various yield groups. The difference in the average yield between the highest and lowest yield groups was 10.3 bushels per acre, while the difference in labor incomes was $1213, or more than 500 per cent of the average labor income of the low yield group.

Table 19—Farms Grouped According to the Yield of Wheat per Acre, 107 Garfield County Farms, 1928

Number of Farms	Yield of Wheat per Acre		Acres in Wheat	Acres in Farm	Prod. Animal Units	Average Farm Inventory	Total Farm Receipts	Labor Income	Rate Earned Per Cent
	Range	Average							
	Bu.	Bu.				Dollars	Dollars	Dollars	
22	10-15	13.7	131	238	12.7	20543	3466	265	3.3
33	16-18	17.0	120	222	14.7	21615	3643	477	4.4
27	19-20	19.7	125	232	16.7	24716	4592	1003	7.1
25	21-40	24.0	151	271	16.0	30695	6059	1478	7.7

The average labor incomes increased consistently with increases in the yields of wheat per acre.

On the other hand, these data should not be taken as proof that doubling the present average yield of wheat would be profitable and certainly not that deliberately planned methods and procedure necessary to bring about such a result would increase the average labor income of farmers by anything approaching the 500 per cent shown in Table 19. The better farmers in most communities are following practices that are not far from the best known, and the average of the whole group of farmers is close to the ideal with financial and operative conditions as they are with the individual farmer. It is true that there is a lag in adjustment to new practices and methods of production, but to deliberately plan to expend the necessary labor and expense necessary to double the yield per acre of crops or production of livestock in a well established area usually results in production so expensive per unit or product as to be unprofitable. There is a tendency for the rates of production of both crops and livestock to increase as time goes on due to the improvements in variety or breed; methods of operation, and knowledge of requirements, but the profitable rates of planned production are usually only from 25 to 50 per cent larger than the average of the neighboring farms. With much higher wheat prices, higher land values, improved varieties, and the use of better metods of soil conservation, it may in time be profitable to produce greatly increased yields of wheat per acre. Too much of the difference in yield in the data shown in Table 19 was due to fortuitous weather and other chance happenings to make recommendations for doubling acre yields advisable on the average farm. If it were most profitable to raise an average of 30 bushels of wheat per acre on Garfield County farms over a period of years, a fair proportion of the farmers in that region would be following such a procedure.

Livestock Receipts

Neither the number of livestock per 100 acres in crops nor the percentage of receipts from livestock showed consistent variations in terms of profit on these Garfield county farms in 1928. On the other hand, the kind and quality of the livestock measured in gross receipts per $100 invested in livestock did show a consistent relationship with incomes. With the relative prices and yields of wheat and livestock products as they were

in 1928 on these farms, the proportions of the various farm enterprises was not an important determinant of income. The well organized and managed wheat field and the good dairy or poultry enterprises were all profitable, the poorly managed enterprise of any sort was unprofitable.

Table 20—Farms Grouped According to Net Receipts per $100 Invested in Livestock, 107 Garfield County Farms, 1928

Number of Farms	Receipts per $100 Invested in Livestock		Acres in Farm	Number of Cows	Number of Chickens	Value of Livestock Products Used at Home	Net Increase and Sales of Livestock	Labor Income
	Range	Average						
	Dollars	Dollars				Dollars	Dollars	Dollars
27	0-59	42	231	6	105	177	417	254
35	60-89	71	223	8	111	172	798	444
26	90-119	100	229	8	135	177	1278	973
19	120-200	150	296	10	122	166	2176	1608

High producing animals are profitable; lower producers are expensive "hay burners." Where the number of livestock is large a smaller portion of the total production is used at home. One hundred seventy-five dollars worth of home raised meat, milk, and eggs were used in the average Garfield county home. The value of these perquisites, meat, milk, eggs, garden, use of auto, farm raised fuel, and house rent are not included in farm receipts. Labor income is the cash income of the farmer in addition to these perquisites.

Apparently displacing wheat with only average quality livestock was not particularly profitable. Only when the return from livestock was above average, was the addition of livestock to the wheat enterprise a means of materially increasing the labor incomes earned On the farms where the return per $100 invested in livestock was less than $90, the labor incomes were less than average as a rule. (Table 20.) These low returns may have been due to the kind of livestock as well as the quality of livestock and the efficiency of production. Land values were high in Garfield county at the time of this investigation, averaging above $100 per acre for good tillable land. When land of this valuation is used in livestock production, the type of livestock production necessary for profit must be of a sort that returns a large income per acre of land. It is doubtful if beef cattle are generally so profitable as to permit the extensive use of level tillable land of the character found in Central Oklahoma in their production. The competition of beef produced on cheaper, rough lands elsewhere makes beef production on the better tillable lands generally unprofitable. An exception is found in the utilization of farm wastes such as wheat pasture and the legume hay and pasture produced in a rotation aiming at soil improvement in which case the use of some level tillable land as a part time supplemental pasture is justifiable on the basis of the total net returns from the farming system.

On a considerable number, 45 of 107 farms, the gross income from livestock averaged a dollar or more for each dollar invested. On the farms where the average gross income was one and a half times the investment in livestock, the labor incomes averaged double that of the entire group, ($1608 as compared with $803). The farms on which the highest average return per $100 invested in livestock was made were slightly larger than the average, and had more than the average number of cattle and poultry.

As previously brought out in the discussion of size of business, most of the farms in the older wheat sections of Oklahoma lack volume of business, hence, the more intensive sorts of livestock fit best into the needs of most farmers. Poultry is the most intensive sort of livestock commonly kept on these farms. Poultry farming requires little land, though this factor is partially off-set by the relatively large investment in buildings and equip-

ment. Poultry has the advantage of high return per dollar of investment, and affords a means of profitable utilization of much labor at otherwise slack periods of the year on these wheat farms. Numerous farmers in these areas have greatly increased their flocks of chickens in recent years with profit to themselves. Winter egg production, rather than meat production, is the primary source of income on most of these farms. Considerable numbers of turkeys are being produced in some areas, particularly in Blaine county.

Dairying is increasing on many farms in North Central Oklahoma. It fits well into the requirements of many farmers desiring to increase the returns from their farms by affording winter employment of labor and providing a market for the legumes grown for the purpose of soil improvement.

Sheep raising has increased several fold in many sections of Oklahoma, particularly Garfield county in recent years. Very profitable sheep and wool prices in recent years have been a decided stimulus to this interest in sheep raising. Over a period of years, sheep are not likely to be more profitable than beef cattle in these areas. On the other hand, the keeping of small flocks of sheep to clean up weeds and otherwise waste feed and pasture will continue to be profitable.

Beef cattle and hogs are being kept in decidedly smaller numbers than formerly. The breaking up of all available tillable land has reduced the cattle carrying capacity of many farms. Also the growing of less corn than in the period following the opening of these lands has reduced the number of hogs raised.

Many of the more progressive farmers have found that a rotation of crops and program of legumes and livestock, aiming at soil improvement as a means of lowering wheat production costs, was profitable over a long period of years. A program of soil improvement will probably increase the number of livestock kept on most farms Should the problem of soil fertility as a limiting factor in low wheat production costs become more serious in the future, the trend towards the keeping of more livestock to utilize the feed produced will become more pronounced. On farms with considerable rough pasture land and where the problem of the profitable utilization of large amounts of surplus labor in the winter months is not pressing or desired, the keeping of beef cattle and sheep will continue or even expand. On the smaller farms where the need for a more intensive utilization of the land and labor supply is desirable, the keeping of poultry and dairy cattle is most likely to increase.

The wide variation in labor income associated with variation in the returns per $100 investment in livestock point out clearly that care must be exercised in the selection and management of livestock if such enterprises are to add rather than substract from the net earnings of the farm. Care must be used, not only in the selection of a kind of livestock adapted to the needs of the business organization of the farm, but also to the management of livestock if efficient and profitable production is to result.

An attempt was made by means of multiple correlation analysis to measure the relative effect of size of business and rates of production on the labor incomes earned on these Garfield county farms in 1928. Acres of wheat per farm and numbers of productive animal units per farm were taken as measures of size of business. The yield of wheat per acre and the gross receipts per productive animal unit were taken as measures of rates of production. It was found that 12.06 per cent of the variations in labor income were associated with variation in the acres of wheat per farm, while 14.26 per cent of the variations in labor income were associated with differences in the yield of wheat per acre. The importance of receipts per animal unit was also slightly greater than the number of animals kept per farm. (Table 21.) On the farms where wheat was the major source of

income, the factors affecting labor income associated with the number and receipts from animals was larger than might be anticipated.

Table 21—Per Cent Determination of the Effect of Four Factors on Labor Income; 107 Garfield County Farms, 1928

Acres of wheat per farm	12.06 per cent
Yield of wheat per acre	14.26 per cent
Number of productive animal units per farm	9.56 per cent
Receipts per productive animal unit	13.19 per cent
Total per cent determination - - -	49.07 per cent

Variations in the four factors; acres of wheat, yield of wheat per acre, number of productive animal units and receipts per productive animal unit were associated with 49 per cent of the variations in the labor incomes made by these 107 Garfield County farmers in 1928.

The yield of wheat per acre was slightly more important in its effect upon labor income than was the number of acres of wheat raised per farm. The amount of reecipts per animal was considerably more important than the number of animals kept. It takes both quality and quantity to make a profitable farm business.

The four factors mentioned above were associated with 49 per cent or nearly one-half of the variations in labor income. The extent to which these four factors measuring the size and rates of livestock and wheat production are associated with the variations in the labor incomes made on these Garfield county farms is particularly significant when it is noted that such important factors as variations in farm expenses, the kind of equipment used, the type and quality of soil, the kind and quality of livestock, and other important factors of farming success are not directly considered in this analysis. Apparently the size and rates of production in the wheat and livestock enterprises on these farms were the major factors determining farming success.

A change of one acre of wheat grown per farm was positively associated with a change of $5.19 in labor income on the average farm in Garfield county in 1928. (Table 22.) Increasing in the yield of wheat of one bushel per acre, all other factors being held constant, was associated with an increase in labor income of $97.28. An increase of one in the number of animals kept for productive purposes was associated with an increase of $28.83 in income, while the addition of one dollar in the receipts per animal unit was coincident with an average increase of $11.14 in labor income. These figures serve to point out the relative importance of the measured factors affecting farm profits.

Table 22—The Average Effect on Labor Income of Four Factors Each Act- Income, 107 Garfield County Farms, 1928

Factor	Increase in labor income
A 1-acre increase in acres of wheat per farm	$ 5.19
A 1-bushel increase in yield of wheat per acre	97.28
An increase of 1 productive animal unit kept per farm	28.83
An increase of $1 in receipts per productive animal units	11.14

Size of Business and Yield as Affecting Wheat Production Costs

Fifteen of the 107 Garfield County farmers, growing an average of 251 acres of wheat per farm, could have sold wheat at an average of 86 cents per bushel and still have secured an average labor income of $600. (Figure 4.) This is leaving all other enterprises as they were in 1928 and figuring

only the effect of lower wheat prices on the total income per farm. On the 19 farms where an average of 64 acres of wheat was grown per farm, a price of $1.45 per bushel would have been necessary for the average labor income to have reached $600. (Table 23.) These widely varying figures on the prices of wheat necessary to obtain a given income on various acreages, while not accurately definable as cost of production, do show the greater economy of production on larger wheat acreage and are indicative of the economic forces behind the tendency towards large farms in the older wheat producing sections.

Table 23—The Sales Prices of Wheat Necessary to Obtain $600 Labor Incomes on Farms of Varying Wheat Acreage, 107 Garfield County Farms, 1928

Number of farms	Average Acres of wheat per farm	Average yield of wheat per acre	Price of wheat per bushel*
19	64	19.5	$1.45
29	91	17.6	1.21
23	119	17.7	1.13
21	175	20.9	.87
15	251	18.4	.86

*Source: Computed on basis of other farm receipts and expenses than wheat sales price remaining as actually reported in Table 15.

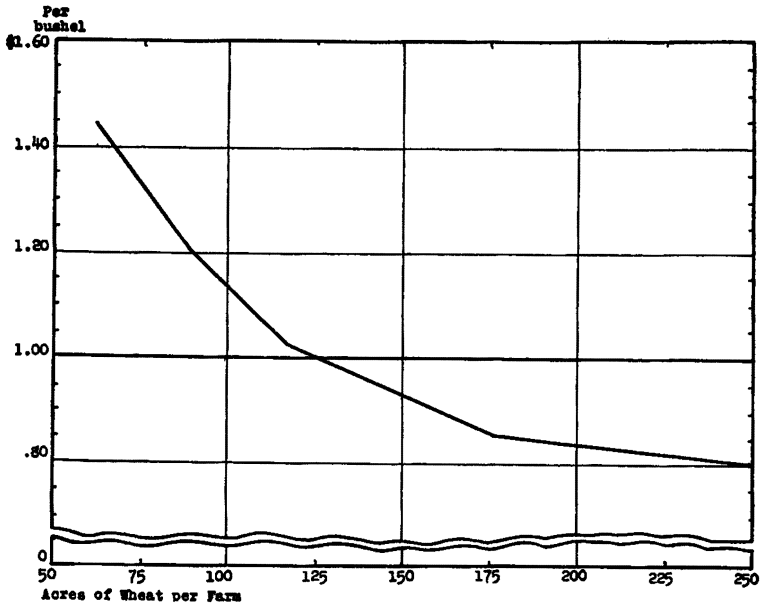

Figure 4—The sales prices per bushel of wheat necessary to obtain $600 labor incomes, the estimated production costs, decreased sharply as the acreage of wheat increased on farms growing less than 160 acres of wheat. Larger acreages of wheat were accompanied by moderate declines in estimates of costs of production.

The average yield of wheat on these 107 Garfield county farms was 18.7 bushels per acre in 1928. The average acreage of wheat per farm was

131 acres, and the average selling price was $1.07 per bushel. Lower wheat prices than those prevailing following the harvest in 1928 would seem likely for the next several years and will tend further to emphasize the importance of economic sized farming units in wheat production.

Likewise, the yield of wheat per acre has an important effect on the minimum sales price necessary to the securing of a given labor income by the farmer. Taking the actual farm business organizations as reported in Table 17, and computing the sales price of wheat necessary to secure a $600 labor income on the groups of farms producing varying acreage yields of wheat per acre, a figure of $1.26 is obtained for the farms producing less than 15 bushels per acre, $1.13 in the 16 to 18 bushel group, 91 cents in the 19 to 20 bushel group, and 83 cents on the farms producing more than 20 bushels of wheat per acre. (Table 24 and Figure 5.)

Table 24—Sales Price of Wheat Necessary to Obtain a $600 Labor Income on Farms Producing Varying Yields of Wheat per Acre, 107 Garfield County Farms, 1928

Number of farms	Yield of wheat per acre (bushels)	Number of acres of wheat per farm	Sales price of wheat per bushel
22	13.7	131	$1.26
33	17.0	120	1.13
27	19.7	125	.91
25	24.0	151	.83

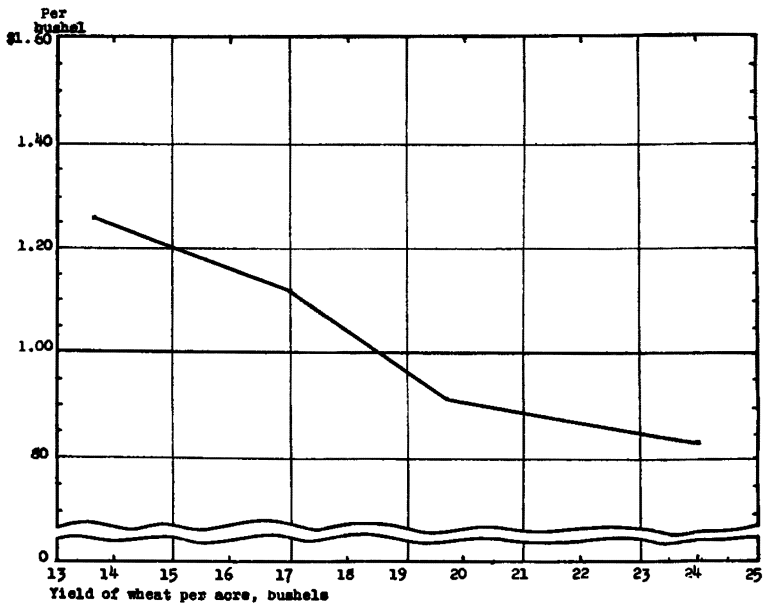

Figure 5—The sales prices per bushel of wheat necessary to obtain $600 labor incomes, the estimated production costs, decreased as the yield of wheat per acre increased, though at a declining rate on the farms with highest yield per acre.

The above figures cannot be logically taken to prove that increasing the average of wheat yields of all farms in this section 23 per cent will necessarily decrease the cost of production 24 cents per bushel, from $1.07 to 83 cents with an increase in yield from 18.6 bushels to 24.0 bushels per acre. A part of the above average yield on the high yielding group of farms was due to chance advantage over the average in timeliness of seeding, soil conditions, freedom from hail and insect damage and other uncontrolled causes. It is possible to lower production costs and increase farm profits by increasing yields only to the point where the addition of increased amounts of labor and expense result in increased outputs of product per unit or dollar of expense.

Gross Receipts Per Acre

An index of farming success measured in terms of gross receipts per acre is shown in the data presented in Table 25. These figures of gross receipts per acre may be taken as standards or minimum requirements of success on farms of this type. The farms that had less than $10.00 of gross receipts per acre on the average lacked $346 of paying expenses; the farmers worked a year with no pay for their own labor, and also lost an average of $346. On the farms that had an average of $25.22 of gross receipts per acre, there was left after paying all other expenses including five per cent interest on the average farm investment, $1,489 as pay for the farmer's own labor and management. There were no significant differences in the sizes of these farms or the number of men employed. Slightly less than the average acreage of crops and number of livestock per farm were produced in the group having less than $10.00 of gross receipts per acre.

Gross receipts per acre is another measure of rates of production. The figures in the table merely emphasize the importance of high rates of production previously discussed in connection with the yield of wheat. Gross receipts per acre is limited in its usefulness as a measure of farming success by the same bias as yield per acre. It is a result of good management, favorable prices, and a combination of circumstances rather than a direct causal factor. As a standard of performance, these figures indicate that gross receipts per acre of $20.00 or more were necessary to afford a satisfactory income on these Blaine county farms. Slightly higher gross receipts per acre were necessary on the Garfield county farms to afford similar incomes because of the slightly larger investments per acre on the Garfield county farms.

Table 25—Farms Grouped According to the Amounts of Gross Receipts per Acre, 110 Blaine County Farms, 1928

Number of farms	Gross receipts per acre		Acres of crops per farm	Productive animal units	Average farm inventory	Number of men per farm	Labor income
	Range	Average					
20	$5.00- 9.99	$ 8.10	156	9.0	$17,468	1.4	-$346
31	10.00-13.99	11.39	172	11.6	16,996	1.4	181
36	14.00-19.99	16.16	171	11.1	21,682	1.4	757
23	20.00-40.00	25.22	163	12.0	18,502	1.5	1,489

The farms that had less than $10 of gross farm receipts per acre, on the average lacked $346 of paying expenses. The farmer worked a year for nothing and lost $346. On the farms that had over $20 of gross receipts per acre, there was left after paying all other expenses, $1,489 as pay for the farmer's own labor and management.

III. EFFICIENCY OF OPERATION

Effect of Size

The basic reasons behind the large labor incomes earned on the large farms are well illustrated in Table 26. Both the acres of crops grown per man and per horse unit more than doubled between the groups of farms growing less than 80 acres of wheat and the group growing more than 200 acres of wheat per farm. These are the basic causes behind the statement that size of business is usually an important factor in determining farm profits. In a year when the returns from farming are above average, the large farm has another sort of advantage in that the greater the total volume of sales, the greater the total profit. However, in a year of average farm profits, size of business has an important bearing on profits through its effect on the efficiency in the use of labor, power and equipment.

Equipment Used

The principal savings or economies in production resulting from the use of a tractor, combine, or any of numerous other kinds of modern farm equipment are largely due to a saving in labor. The per acre or per unit costs of the use of the new machine are often as large or larger than of the equipment displaced. The principal saving in the use of a tractor is in the labor used, not in the power cost itself. On the road as well as in the field, horses are practically as economical in their power cost as motors, but most people would not think of making a 1000 mile trip with a team

Table 26—Efficiency in the Use of Man Labor and Power on 104 Garfield County Farms Grouped According to Acres of Wheat Raised per Farm, 1928

Acres of wheat per farm	Number of farms	Acres of crops per farm	Number of men per farm	Number of horses per farm	Per cent of farms using tractors	Machinery inventory per acre	Crop acres per man	Crop acres per horse unit*
29- 79	17	97	1.4	4.7	59	$4.08	71	13
80-104	29	116	1.3	5.2	38	3.22	92	17
105-149	23	157	1.3	6.1	65	3.99	117	17
150-199	21	211	1.4	4.2	90	6.76	148	23
200-400	14	305	1.8	5.6	100	5.57	169	27

*In computing horse units the 10-20 H. P. tractors were calculated as the equivalent of four horses and the 15-30 H. P. tractors as the equivalent of six horses. These estimated equivalents were added to the number of horses kept to arrive at the figure of horse units per farm.

because their time is worth too much, even though the expense of the team would be perhaps less than with an automobile.

One of the common points in the sales talk of many tractor manufacturers has been that the tractor eats only when it works. Such a statement does not prove that the cost per hour of the tractor is any less than the cost of similar accomplishment with horses. A more important point in deciding which is the best source of power for most farmers is, will the tractor do the work required in less time than is possible with convenient sized horse units, and, if so, can the time saved be used to advantage otherwise?

It is the labor saving factor of tractor farming that is causing the distinct trend towards larger farms in much of the wheat and row crop areas all over this country at the present time. This tendency will be more pronounced in the future as machines especially adapted to tractor use are built instead of attempting to use horse machinery behind tractor power as in the past.

The number of men per farm did not increase anything like proportionately with the increase in the areas of wheat grown or the total acres of all crops grown per farm. (Table 26.) The value of machinery which includes the values of the tractor, combine and other farm machinery amounted to $4.08 per acre or an average of $625 per farm in the group growing less than 80 acres of wheat. The amount and total value of machinery per farm tended to increase with the amount of crops grown though not proportionately. The machinery investment per acre averaged a half larger on the farms raising more than 150 acres of wheat than on the small farms, yet more than three times as much machinery was available per farm on the larger than average farms.

Use to Capacity

It has been the common experience of farmers that tractors were not profitable on small farms. A recent investigation made by the Oklahoma Agricultural and Mechanical College indicates that the cost of operating a tractor per hour is largely dependent upon the number of hours the tractor is used annually. When a tractor is used less than 500 hours per year, the cost of operation tends to be very high because of the large interest and depreciation charges per hour of use. The figures on cost of tractor operation per hour in Table 27 do not include any charge for value of operator's labor in driving the tractor.

Table 27—Cost of Operating Tractors in Northwestern Oklahoma 15-30 H. P., 1929

Number of tractors	Days of tractor use per year		Total Annual Cost	Average Cost Per Hour
	Range	Average		
8	10-30	22.3	$401.39	$1.79
17	31-50	41.4	532.47	1.28
12	51-70	56.9	575.01	.84

Unpublished thesis material of A. B. Chase, Agricultural Economics Department, Oklahoma Agricultural and Mechanical College.

The costs of tractor use are excessive when the tractor is used only a few days per year. On small farms there are only a few days of tractor work available per year, therefore, the costs are usually very high. The same basic reason is behind the greater efficiency of man labor, horse labor, and other farm machinery illustrated in Table 26.

To be used efficiently often implies to be used to capacity, and efficient production is necessary for economical production and farm profits. Therefore, the introduction of the combine and tractor have the tendency to increase the acreage of the average wheat farm to a size that provides an acreage of wheat sufficient to make full use of a tractor and combine. Many people have become alarmed at this tendency toward larger farms, seeing in it the coming of corporation farming and the breaking down of our present system of independent family owned, family operated farms. There is nothing like that threat in the present mechanization of agriculture. Farms in the future will be larger than in the past because larger machines increase the capacity of their operators. On the other hand, the biological nature of agriculture has not been changed. It is still the production of living growing things. The importance of personal interest and self supervision has not been lessened. Large farms and large farm investments require a higher type of managerial ability than the less commercialized farms common in the past, but do not threaten the alert and skilled business man, who is the farmer of the future.

The figures presented in Table 28 illustrate an important economic principle that is deserving of attention There is an inherent bias in all data

collected by the survey method in that the values placed upon the various items in the farm inventory are of necessity largely estimates. The farms on which the values were placed at a relatively high figure were therefore at a disadvantage when compared with farms on which the inventories were placed on a more conservative basis. However, in spite of this evident bias the farms that had the largest investment per acre made the largest incomes for their operators. It is an economic truism that superior instruments of production are usually undervalued while inferior agents are over-valued. This is true of land, equipment, productive livestock and even the services of hired men. In the valuation of the various factors of production, there is a tendency for all factors to be priced at a figure close to the average. The best land does not usually sell at a price sufficiently above the price of poor land but what it can be paid for in the same time and perhaps with greater ease than is the case with inferior land.

Table 28—Farms Grouped According to Total Farm Investment per Acre, 110 Blaine County Farms, 1928

Number of farms	Total farm investment per acre		Acres per farm	Productive animal units	Value of real estate per acre	Average farm investment	Labor income
	Range	Average					
19	$50- 69	$ 54.88	237	10.3	$44.74	$13,029	$394
22	70- 79	70.45	221	11.5	59.07	15,629	439
37	80- 89	85.68	216	10.9	70.30	18,478	707
32	100-200	103.15	226	11.7	88.93	23,297	831

Good land is generally underpriced relative to poor land. It is generally easier to pay interest on $100 land than $50 land when the earning power of the land is considered. Land is cheaper than labor.

Good cows are profitable, yet the usual sale price does not generally reflect the difference in earning capacity. Farmers retire from good farms; they exist and die on poor ones. The better instruments of production are usually the cheapest when their earning capacity and efficiency are considered.

Table 29—Farms Grouped According to Number of Acres of Crops Grown Per Man, 110 Blaine County Farms, 1928

Number of farms	Acres of crops per man		Acres of crops per farm	Productive animal units	Average farm investment	Number of men per farm	Labor income
	Range	Average					
32	0- 99	77	133	12.0	$15372	1.7	$359
29	100-119	104	139	10.3	15533	1.3	464
36	120-199	139	181	10.4	21130	1.3	457
13	200-300	217	276	12.1	29164	1.3	1445

The farms on which over 200 acres of crops were grown per man made labor incomes averaging $1445. The number of animals kept per farm and the number of men employed were practically uniform in the last three groups of farms, Table 29. Economy in the use of labor, as indicated by the acres of crops grown per man, is an important factor in determining farm profits.

Efficiency of Labor

The acres of crops grown per man is the most important index of efficiency in the use of labor to be had on these farms. The amount of livestock kept per farm did not vary proportionately with the acres of crops grown or the number of men employed per farm. The intensity of cultiva-

tion was not particularly different with the various crops on farms of varying size. The effect of varying numbers of acres of crops per man is shown in Table 29. On the two groups of farms where less than 120 acres of crops were grown per man the labor incomes averaged less than hired man's wages. On the 13 farms where from 200 to 300 acres of crops were grown per man the average labor income was $1445.

This factor of optimum acreage of crops per man is perhaps the most important factor influencing the changes in size of farm in most farming areas. We are working under a system of competitive price economics. Every individual business man is striving so to adjust his business as to produce the largest net gain for the capital, cash expense, and his own labor. In some of the wheat growing sections of western China, where hand methods of production still prevail, the optimum size of wheat farm is about four acres. That is the size of unit that best fits the requirements of a Chinese family. The average human labor requirement is in excess of 240 hours per acre. The returns per hour of labor are necessarily small; the average wage for a Chinese laborer is about $21.00 per year. In this country there is found to be a close inverse relationship betwen the hours of labor required in growing an acre of wheat and the returns to labor. In recent years the returns per hour of labor spent in wheat production have averaged several times higher in the western part of the wheat belt where the labor requirement is low than in the older eastern portion of the wheat belt where the smaller acreages preclude the use of modern wheat growing equipment. The optimum combination of labor and land in wheat production must of necessity vary widely with differences in soil and climatic conditions, changes in the general level of prices, and the methods and machinery of production.

Table 30—Farms Grouped According to Number of Productive Animal Units Kept per Man, 110 Blaine County Farms, 1928

Number of farms	Number of productive animal units		Acres of crops per farm	Total acres in farm	Number of cows	Number of hens	Receipts from livestock	Labor income
	Per man range	Per farm, average						
32	0- 5.9	5.8	144	181	3.6	75	$503	$346
34	6- 8.9	10.5	176	233	5.8	93	584	470
31	9-11.9	13.9	179	242	7.2	101	879	759
13	12-25.0	17.8	172	238	7.6	110	1000	871

The farms keeping the most livestock made the most money. Increasing the amount of livestock kept is one way of increasing the size of the farm business.

NOTE: The following are equivalent to one animal unit: 1 cow, 1 bull, 2 young cattle, 1 horse or mule, 2 colts, 5 hogs, 10 pigs, 7 sheep, 14 lambs, or 100 hens. Horses and mules are not included in the number of productive animal units unless kept primarily for breeding purposes.

The amount of livestock kept per man on the Blaine county farms affected the labor incomes earned to a considerable extent. The increases in the number of animal units maintained per man were closely proportionate to the average labor incomes earned in each of the four groups of farms. (Table 30.) The mere number of animal units kept per man does not take into consideration any variations in the kind or quality of livestock that was maintained on the various farms. As previously pointed out, one of the most important limiting factors in the determination of farm profits on these wheat farms was size of business. Livestock of the more intensive sorts, particularly poultry and dairy cows, offers one means of increasing the gross income per acre and utilizing the by-product feeds and labor, hence is a means of increasing the volume of business per farm and per acre. Futher adjustment along these lines will probably be

made as time goes on. In fact, present trends in farm organization indicate that farms in the wheat raising sections of Oklahoma will in the future be both large in total acreage and more diversified in production.

Kind of Power Affects Labor Efficiency

Because of the close relationship between the kind of power used and the efficiency in the use of labor, the effect of the kind of power used on the incomes earned is treated under the heading of labor efficiency. Power equipped farms show a considerable advantage over horse equipped farms in Blaine county in 1928. The farms using both a tractor and a combine made average labor incomes for their operators more than seven times as large as the horse equipped farms. The farms that were equipped with only a tractor made average labor incomes of $697 or $105 more than the average of all farms. (Table 31.)

The reasons for the larger earnings of the power equipped farms are found in the larger acreages of crops grown per farm and the greater efficiency in the use of labor. The tractor and combine equipped farms averaged 56 acres of crops per farm more than the horse equipped farms yet only $69 more were spent for hired and family labor.

It is interesting to note that the median age of farmers using power equipment was considerably lower than that of the horse farmers. Age is a factor of farming success of first importance when it affects the ability or willingness of the farmer to take on new ideas and new methods in a time of rapidly progressing agriculture.

Table 31—Farms Grouped According to Power Equipment, 110 Blaine County Farms, 1928

Power equipment	Number of farms	Median age of operators	Value of hired and family labor	Acres in crops per farm	Total investment per farm	Investment in machinery per farm	Machinery and repairs depreciation	Labor income
Tractor and combine	23	36	$320	196	$23,681	$1,873	$733	$903
Tractor only	41	39	251	172	18,520	842	279	697
Combine only	7	39	203	154	15,758	1,143	294	847
No power machinery	39	42	251	140	17,129	428	135	127
Average	110	39	263	167	18,930	930	324	592

Labor income is receipts minus expenses, minus 5 per cent interest on the average investment; it is the return to the operator for his own labor and management. Power farming was more profitable than horse farming in Blaine county in 1928. One of the reasons for this was that more acres of crops were grown on the farms using power equipment. The larger incomes on the power equipped farms were due to the combination of larger acreages and greater efficiency in the use of labor.

Grouping the farms in Garfield county according to the kind of power and equipment used showed even greater differences in earnings than on the Blaine county farms. The tractor and combine equipped farms in Garfield county in 1928 paid their operators $1000 more for their year's work than did the horse equipped farms. (Table 32.) Again the difference can largely be accounted for by the larger acreage of crops on the power equipped farms without a proportionate increase in labor costs. An average of 96 more acres of crops was raised on the tractor and combine equipped farms with only $117 increase in expenditure for hired and family labor other than that of the operator.

Table 32—Farms Grouped According to Power Equipment, 106 Garfield County Farms, 1928

Power equipment	Number of farms	Median age of operators	Value of hired and family labor	Acres in crops	Total investment per farm	Investment in machinery per farm	Machinery repairs and depreciation	Labor income
Tractor and combine	33	36	$283	220	$32,941	$2,359	$683	$1,427
Tractor only	36	42	344	160	25,093	1,098	286	580
Combine only	4	44	210	168	20,880	1,000	247	760
No power machinery	33	45	166	124	16,927	215	74	426
Average	106	41	266	167	24,800	1,206	340	803

The use of power equipment on Garfield county farms was even more pronounced in its effect on labor income than on Blaine county farms. The farms having both a tractor and combine raised 96 more acres of crops and made labor incomes averaging $1000 more than the farms using only horses. Wheat on these 106 Garfield county farms averaged 18.7 bushels per acre in 1928. Large power equipped farms, having a large cash expense, would not show up to as great an advantage in a year of low yields or very low prices of wheat.

Machinery repairs and machinery depreciation charges amount to considerable figures on well equipped farms. The average of these two items amounted to approximately $700 on the tractor and combine farms in comparison with about $100 on the horse equipped farms. In order to overcome this disadvantage of large expense it was necessary for the tractor and combine to increase the capacity of their operator to a considerable extent; this was apparently accomplished on these Blaine and Garfield county farms. On the other hand, unless the size of the farm business is adjusted to the capacity of the machines used, the introduction of large modern machinery may result in a decrease rather than an increase in the profits from farming.

Arrangement of Fields and Farmstead

The data obtained in this survey did not permit a detailed analysis of the effect of convenient arrangement of the fields and farmsteads on efficiency in the use of labor. Certainly a part of the efficiency shown in the large number of crop acres cultivated per man and per horse equivalent on some farms was due to the convenient arrangement of fields. Likewise convenient barns and location of buildings one to another promote efficient and economical use of labor.

The importance of size and shape of fields is emphasized by the increased use of large tractor or horse drawn equipment on modern farms. Large fields of regular shape make possible considerable savings in labor. On some farms a rearrangement of the fields would be profitable; savings in fencing costs as well as labor might be effected. Convenient barns, well equipped with labor saving devices, are a good investment for farmers whose time is worth money.

The essence of good management in the efficient operation of farms is carefully-thought-out plans of work. Well arranged fields and farmsteads are evidences of this attention to details.

IV. BALANCE OF BUSINESS

By balance is meant the adjustment of the various enterprises making up the farm business organization so that the largest total net income is obtained. A well balanced farm business is one that makes the fullest use of the various factors of production, land, equipment, and labor, that

economic returns will justify. Diversity carries something of the same meaning as balance though it is not so definite or concise in its economic significance. Diversified farming implies merely that a number of farm enterprises are carried on and that the farm income is derived from several sources. Such a diversified farm business may or may not be more profitable than a one enterprise farm. The term balance infers an adjustment between the natural and economic conditions prevailing on a given farm, not merely a diversity of enterprises.

The problem of proper balance in a farm business deals specifically with such problems as the economical utilization of by-products and farm wastes, the utilization to capacity of farm equipment and power, the distribution of labor, the conservation and improvement of soil fertility, and the various supplementary and complementary relationships of the farm enterprises from the standpoint of money income to the farm operator. The advocates of many so-called diversified systems of farming have met with failure in putting their recommendations into practice because the money income resulting from such procedure did not adequately repay the farmer for the additional labor and capital invested.

Too many systems of diversified farming, while ideal from the standpoint of labor distribution, soil fertility maintenance, and distribution of income have resulted in both lowered total annual income and returns per hours of labor expended. There are many sections in both the wheat and cotton producing areas of Oklahoma where the supplanting of either of these two major enterprises by considerable amounts of feed crops and livestock has led to decreased net incomes in recent years. This is particularly apparent in the areas where soil and climatic conditions are very favorable to the production of these crops and not so favorable for feed crops. A depletion of the soil with the passing of time or a permanent change in the relative price of competing farm products may make advisable a different farming system than has in the past been most profitable.

Profits Depend Upon Relative Costs and Prices

The most profitable adjustment of the various enterprises on the farm, one with another, is not something that can be determined once and for all time. It is a problem that is continually shifting with the changes in the cost of the input factors of production as well as the relative prices of the products produced for sale. Good balance on one farm may not be the most profitable combination of enterprises and adjustment of the factors of production on another. Each farm business is an individual and separate problem, the proper solution of which must be considered in the light of the peculiar abilities and preferences of the farmer himself, the differences between farms as to crop and livestock adaptation and geographic location. The choice of alternative enterprises to be followed on any farm varies greatly from time to time with changes in relative prices and costs. In some instances it is better to allow certain by-products to go to waste and not to attempt full utilization of all labor, where such procedure does not add a sufficient amount to the net annual income of the farmer to justify the additional effort and expense.

There is a tendency for farms to be more specialized and less diversified than formerly. This is in line with the specialization that is going on in other lines of business; specialty shops are taking the place of the general store and many manufacturers limit their production to a particular portion of their field of industry. It is logical that farming should follow similar lines because the economic forces now acting on both agriculture and other industries have much in common. Specialized machinery, representing a large investment, technical skill and knowledge, cheap transportation, and the natural conditions favoring the production of particular products in certain areas are powerful forces tending to cause spe-

cialization. The general farmer is finding it increasingly difficult to compete successfully with the specialized farmer using better equipment and specialized technical skill or ability. Specialized farming offers the greater opportunity to the college trained or otherwise well informed farmer. Some lines of specialized farming such as the raising of purebred seed or livestock offer very good opportunities to scientifically trained men who have salesmanship ability as well.

This does not mean that a specialized farm should not be well balanced. Utilization of by-products, distribution of labor, and other economies in production must be considered on the specialized farm as well as the general farm if the largest net income is to be obtained. The advantages of diversification and self sufficiency in farming will continue to be stressed in time of severe agricultural depression but will be less important than in the past in periods of farm prosperity.

Soil Fertility

A factor that is likely to have a pronounced effect in the future upon the organization of farms in the wheat growing sections of Oklahoma is that of soil fertility. Wheat lands in this State are all relatively new. Wheat in most countries tends to be a pioneer's crop. In the past wheat has been the most profitable means of turning virgin soil fertility into a marketable form, but it may not be able to successfully compete with other crops once this original soil fertility is used up. Many farms in the older wheat growing sections of Oklahoma are already showing signs of soil depletion. Considerable quantities of commercial fertilizer are being used in the older and more humid wheat growing areas in eastern Oklahoma. Some farmers, particularly those in Garfield and adjacent counties, are finding it profitable to practice a considerable degree of crop rotation and thus attempt to build up the fertility of wheat lands through the use of legumes and manure from livestock. More and more farms are being terraced to conserve both soil fertility and rainfall.

Labor Utilization

The problem of the profitable utilization of the labor of the farmer and his family has an important influence on the type of farming that is most profitable. The chief advantage of modern power equipment lies in the saving of labor. It is possible, with large equipment and efficient management to produce wheat on large acreages with less than three hours of man labor per acre. This includes all the operations of seed bed preparation, sowing and harvesting. The risk of crop deterioration and loss limits the length of harvest period and in turn limits the amount of wheat that can be grown by one outfit of wheat harvesting equipment. Wheat production requires attention fo rshort and rather definite periods. The total labor requirement in producing 20 0acres of wheat does not necessarily exceed 60 days of labor on a well managed farm. On such a farm one man will perform all of the operations of producing the wheat crop except at harvest time. It is impossible for any system of farming to be evolved, and long maintained, that is so profitable that two or at the most, three months of labor will produce a satisfactory annual income. Formerly, the wheat farmer obtained somewhat of a distribution of his labor by growing the feed crops necessary for the maintenance of his work stock. The general use of the tractor limits this means of labor utilization.

The problem confronting the wheat farmer in the profitable utilization of his time when he is not engaged in producing wheat is basically the reason for much of the interest in dairy and poultry production in the wheat belt. In the areas that are well adapted to wheat production, these intensive types of livestock production do not usually afford as large a return per hour of labor spent as does wheat. The same principle is applicable in the case of most cash crops in comparison with livestock. Live-

stock does not usually return as high a wage per hour as cash crops because of the factors of labor distribution and utilization, and because of the competition of the large amounts of livestock production arising from the utilization of waste and by-product feeds, or on otherwise waste land. However, in many instances, livestock production affords the best available means of cashing otherwise waste labor and feed and thereby increasing the annual net income of farmers. The importance of these enterprises supplemental to wheat production seems likely to increase, particularly in the eastern portion of the present wheat belt.

Agriculture is a biological industry in which time and the growing seasons of the year have a direct bearing on the seasonal distribution of labor requirements of crops and livestock. This variation in the need for attention by various farm enterprises at specific periods in the year makes profitable the combination of certain crops and livestock enterprises. Also certain farm enterprises produce the raw materials, or in other ways make direct contributions that are used in the production of other produce on the same farm. As stated earlier in this bulletin "the existence of supplementary and complementary relationships between various farm enterprises constitutes the chief economic reason for diversified farming"** This statement in no way contradicts or voids the present tendency towards more specialization in agricultural production.

Poultry was a profitable enterprise on these Garfield county farms in 1928. Only 12 of the 107 farms maintained flocks of over 200 hens per farm, yet the labor incomes on these 12 farms averaged $230 larger than on the farms keeping smaller flocks of poultry. (Table 33.) The farms keeping large poultry flocks also kept more than the average number of cows and were larger in total acreage than the average farm hence only a part of the larger labor income can be attributed to the keeping of poultry.

Table 33—Farms Grouped According to Number of Hens Kept per Farm, 107 Garfield County Farms, 1928

Number of farms	Number of hens		Number of cows	Acres in farm	Productive animal units	Value of livestock products		Sales per animal unit	Labor income
	Range	Average				Home use	Total sales		
49	0- 99	63	6.5	233	13.8	$162	$964	$69.86	$705
46	100-199	132	8.0	233	15.5	177	1,057	68.19	706
12	200-500	283	10.2	289	23.5	206	1,780	75.45	935

With the increasing commercialization of agricultural production it is very important that farmers become better informed as to trends in the costs and volume of production in competing areas, changes in the prospective demands for the products and other facts of economic nature that affect the profitableness of their farms. This is particularly true of new lines of production. Large profits are often possible in some of the minor sidelines such as fruit and vegetable production so long as the amount produced does not exceed local requirements.

Increasing the number of cows kept per farm generally had the effect of increasing the returns for the farm operator's labor and management. (Table 34.) However, as shown by the smaller labor income of the second group in the above table, the farms keeping five and six cows, the keeping of more cattle was not profitable when the returns per animal unit were low nor was the keeping of an additional two or three cows sufficient to off-set

**Footnote, page 9 this bulletin.

the effect of the decreased total number of productive livestock or the smaller total acreage of land per farm.

Table 34—Farms Grouped According to Number of Cows Kept per Farm, 107 Garfield County Farms, 1928

Number of farms	Number of cows		Productive animal units	Acres in farm	Number of hens	Value of livestock products		Sales per animal unit	Labor income
	Range	Average				Home use	Total sales		
26	0- 4	3.0	12.5	246	112	$163	$948	75.84	$668
27	5- 6	5.6	11.8	190	104	176	743	62.97	276
28	7- 9	7.8	14.6	256	89	162	923	63.22	928
26	10-40	14.0	23.7	266	167	193	1,794	75.70	1,156

The importance of large receipts per animal unit is well illustrated in the above table. The labor incomes earned increased with the returns per animal units as well as the total number of production animals kept per farm. Size of business and rates of production are two of the important factors affecting profits. Both are essential; one is not a substitute for the other.

The addition of poultry and dairy cows to the main enterprise of wheat production are but two of the many ways that Blaine and Garfield county farmers have found of balancing their farm businesses. Relatively high prices of dairy and poultry products have prevailed in recent years and thus favored the expansion of these two enterprises. Alert farmers will continue to seek these profitable means of increasing their incomes and thus raise their standard of living.

V. PRICE RELATIONSHIPS

Trend of Wheat Prices

The further introduction of the tractor and combine into new areas with virgin soils and low land values both in this and foreign countries may result in continued large production and low wheat prices for the next several years. During the past decade, there has been a tendency for wheat production to outrun the demand for wheat in spite of the increased standard of living prevailing and an increased use of wheat in place of rye and rice by many people in both Europe and the Orient. Should wheat prices fall relative to the price of other farm products it is entirely possible that farmers in north central Oklahoma will find it advantageous to largely substitute other crops for wheat. Price relationships as well as climate and soil have a very definite effect upon the system of farming and the farming organization that is most profitable. One of the most perplexing problems, yet one of the greatest importance, is to judge accurately the effects of changing economic forces in terms of profitable farm business organizations of the future.

Economic Forces Affecting the Profitable Organization of Farms

The business or financial side of farming is becoming increasingly important as time goes on. Large investments in land and equipment and large cash expenditures make increasingly important proper decisions in financial matters. Also as farming loses its self sufficing aspects and takes on the characteristics of a business carried on for profit, it is essential that farmers pay more attention to the effect that business forces in other industries have upon farm profits. There is a widespread interest among

farmers in the agricultural outlook material published by the United States Department of Agriculture and the various state agricultural colleges. Current Agricultural Economics is a publication of this sort prepared by the Agricultural Economics Department of the Oklahoma Agricultural and Mechanical College as a means of guiding Oklahoma farmers in making their farm production and marketing plans.

Prices affect the profitableness of the farm business both as to the price received for the products sold and the cost of things purchased. In addition to variation in crop and animal production due to the influence of climate, there are the planned changes in production as to number of breeding stock maintained or acreages of crops planted which are largely the result of farmers' reactions to present or anitcipated price relationships. Fairly definite cycles of production for most classes of livestock can be forecasted. Equally important are the changes in the demands for farm products due to variations in business activity, the so-called business cycle and its effect upon the earnings of industrial workers.

The system of farming followed in any area is largely the result of past price relationship; profit is the guide to production. A factor vitally affecting the standard of living of farmers is the purchasing power of farm products in terms of the commodities used in living and farm production. The purchasing power of farm products is affected not only by the supply and demand relationships of all commodities but also by the course and height of the general level of prices. The importance, particularly, of the trend, upward or downward, of commodity prices on the prosperity of farmers is not generally recognized. Much of the prosperity of farmers during the World War was accounted for in the lag in wages and expenses rather than the height of prices due to war-time demands.

Effects of Inflation and Deflation

The inflation of money, that is the increase in the supply of currency and credit relative to the volume of business transacted, which resulted in rising commodity prices during the World War and for a year and a half following the signing of the Armistice, made farming generally profitable, stimulated production and culminated in a rapid rise in land prices. Deflation, the decrease in the relative supply of currency and credit available, resulted in a drastic decline in the price in 1920 of most farm products without causing a proportionate decline in the prices of the things used by farmers in living and farm production. The reason back of the lowered purchasing power of farm products in periods of monetary deflation is found in the fact that, because of more centralized organizations and the restrictions of organized labor, the producers of industrial products, the middlemen, and service agencies generally are better able to control production and the prices of their products and services than are the unorganized producers of farm products. The low purchasing power of farm products during much of the past 10 years has been largely the result of high taxes and high retail prices of the things purchased by farmers rather than lower prices due to overproduction of the farm products sold. Disparity between wholesale and retail prices is characteristic of all periods of violent change in the general level of commodity prices.

Wages Lag

In a period of rapidly rising prices such as that experienced during the World War, the prices of farm products and most other raw materials rose faster than wages, rents, taxes, freight rates, or other costs of production and distribution. The purchasing power of farm products was high and farming was generally profitable. (Figure 6.) It is worthwhile to recall that this was the period of the "High Cost of Living." Wage earners and persons on stationary incomes were at a disadvantage. Real wages, that is, wages in terms of commodities, were low.

Purchasing Power of Wheat on Oklahoma Farms and Wages of New York Factory Workers

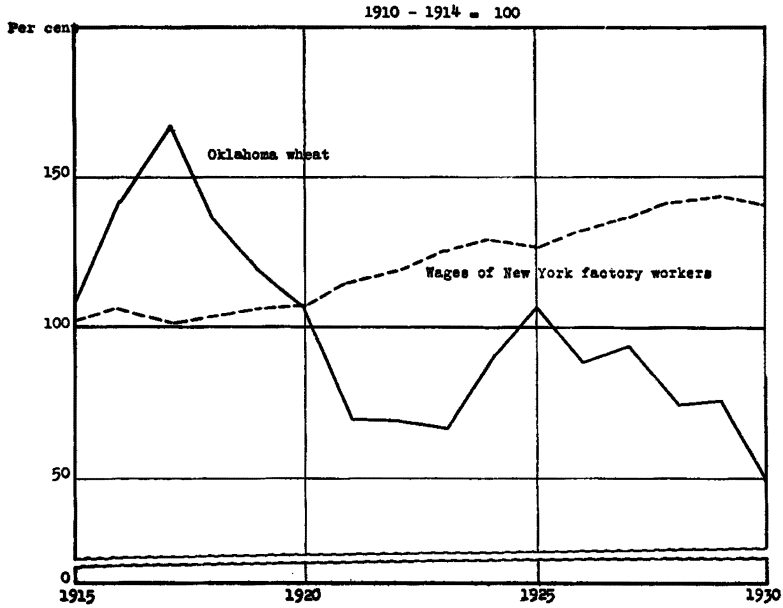

Figure 6—Purchasing Power of Wheat on Oklahoma Farms and Wages of New York Factory Workers.

The purchasing power of the wages of New York factory workers has increased almost continuously since 1915 until in 1930 a day's work would buy 40 per cent more than before the World War. A bushel of wheat in Oklahoma in 1930 would exchange for one-half as much as in 1915. This disparity in earnings is the basis of the discontent and distress on farms.

Following 1920 the trend of prices was downward and the situation of wage earners and farmers was reversed. The costs of production and distribution remained high. Farm products had a low purchasing power and the real wages of industrial workers were high. An adjustment has been going on since 1920 tending to equalize the relative position of workers in cities and on farms. For the past 10 years there has been a net movement of three-quarters of a million persons each year from the farms to the cities in the United States. Eventually an adjustment in earnings between the various groups of producers must take place. A period of price stability would hasten this adjustment.

In the meantime, the problem of organizing a farm business along the most profitable lines is, in part, a price problem and as such must take cognizance of the effects that price trends have upon the costs of production, demands for specific farm products, and, in general, the result in terms of farm income of shifts in the long time trend of commodity prices. Agriculture, as an industry, has a large investment and a slow turnover, hence is slow in making adjustments. It is very important that farmers make accurate estimates of the future trends of prices. (Figure 7.) A declining general price level for the next several years, such as many well informed financiers anticipate, will put a premium upon management that is cautious in contracting long time debts that have to be paid later with more valuable dollars and that is able to reduce production costs.

Index Numbers of Oklahoma Farm Price of Wheat and the Wholesale Price of all Commodities

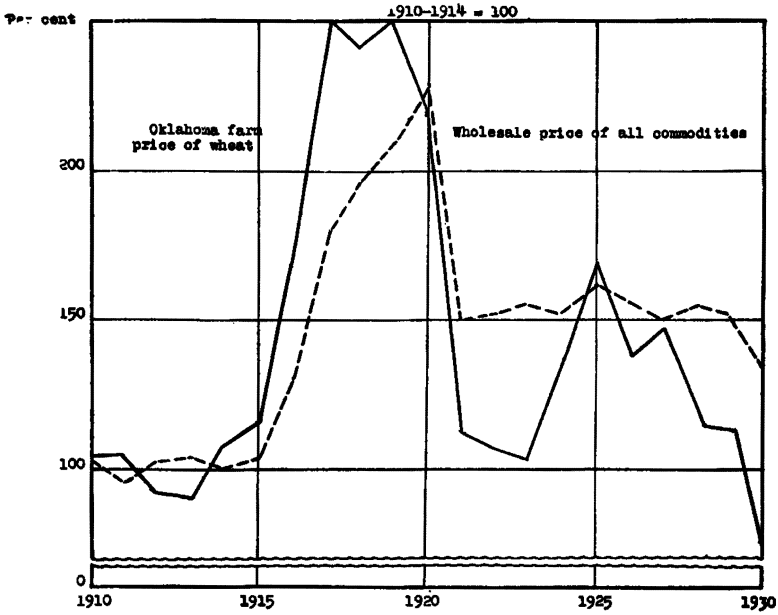

Figure 7—Index Numbers of Oklahoma Farm Price of Wheat and the Wholesale Price of all Commodities.

During the past 20 years changes in wheat prices have preceded changes in the general price level. Wheat prices in 1930 went below the pre-war average. The trend of the general level of prices of all commodities has been downward since 1920 sharply so in 1921 and 1930.

Lowered Costs of Production

An important contributing cause to the continuance of the agricultural depression, particularly in recent years, has been the stimulation of production of certain farm products because of lower production costs resulting from more efficient production methods and the use of more mechanical equipment and power. This increased supply of products in the face of low prices has been most noticeable in the case of wheat. The introduction of the combine and tractor has lowered the costs of wheat production in certain areas in this and in foreign countries to a point where the prevailing prices during the past 10 years were such as to stimulate wheat production. More than a million acres formerly in grass have been broken up and put to wheat in Western Oklahoma during this period. The extension of the wheat growing area has taken place in the semi-arid states bordering the foothills of the Rocky Mountains, and in Canada, Argentina, and Australia. The center of both wheat and cotton acreage has moved more than 100 miles westward in Oklahoma during the past 10 years.

Shifts in Producing Areas

This shift in the location of the low-cost wheat producing areas must result eventually in some far reaching change in the organization of wheat farms in the older wheat growing regions. The wheat lands most recently brought under cultivation are generally the areas of lowest costs due pri-

marily to their better adaptation to the use of large tractors and combines. Wheat is a foodstuff, the use of which does not greatly increase with lowered prices. Wheat consumption in this country has been declining in recent years due to changes in the American diet. Less heavy manual labor and the desire for a slim figure have reduced slightly the consumption of energy and fat producing foods. Disrupted financial and political conditions have reduced the demand for American wheat in most of the foreign markets. Some improvement may eventually take place in the export demand for wheat, though the present tariff policy of this and other important nations is working against this tendency. Hence, the production of wheat on new lands calls for something like an equal reduction of wheat production in the older wheat areas before the excessive production of wheat is curtailed.

Wheat production costs have been definitely lowered in the past 10 years in many important wheat growing sections. Prospective low wheat prices for the next several years call for a downward revision of land values in many of the older wheat growing sections, and an adjustment of the farm organizations toward large units better suited to the requirements of modern wheat machinery, or a substitution of other farm enterprises where the economic returns of such enterprises are more attractive.

In a highly competitive industry, such as wheat farming, cost of production affects the price of wheat only to the extent that it determines the amount of wheat that is produced. A permanent change in the cost of production or a change in the relative price of the products sold affects the most profitable combination of enterprises making up a well balanced farm business. The effect of relatively high wheat prices during the period 1924 to 1928 was to bring about an increase in the percentage of crop land devoted to wheat production in North Central Oklahoma. Lower prices of wheat during the next few years may make desirable a shift to a system of farming in which wheat is decidedly less predominant.

PART III

APPLICATION OF RESULTS

The main value of a farm business analysis such as has been described in the preceding pages, lies in the possibility of using the results in showing where and how the management of farms may be made more profitable. Knowing something about the outlook for prices of farm products one or several years in the future, the average crop yields that can be expected in the future, the feed requirements of livestock at various rates of production, the acreage of different crops that can be cared for by a given labor force, the farm expenses that are normally incurred with various systems of farming, and one's own abilities and likes, it is possible for a farmer to plan, in most cases, fairly definite farming systems for some time in the future, yet allowing some degree of flexibility for changes from year to year or within the year in response to unexpected price changes.

Every farmer makes some plans for a year or more ahead. In this section of the bulletin, plans for two actual farms are shown in more definite form than farmers usually make them. It is hoped that the form and method, as well as the data on feeds used, and incomes and expenses, may be useful to other farmers who wish to make somewhat definite plans for the future.

Present Organization of a 160-Acre Farm

The present organization must be taken as a starting point in reorganizing a farm. Table 35 shows a plan for a 160-acre farm, the most common size, in Garfield and Blaine counties. In order to make the net income of the present organization comparable with that of the revised plan, average yields and expected prices of farm products on this farm had to be used rather than the yields and prices actually prevailing in 1928. This necessitated several adjustments in incomes and expenses. Otherwise, the results shown are those obtained in the survey for 1928.

The outstanding features of the present organization are the high production of butterfat from eight cows, fairly high returns from poultry and eggs, and the large amounts of feed bought. The price of butterfat received on this farm has been above average because whole milk is sold to a nearby city. This special market is expected to continue. The cows are well fed and cared for, and produced 340 pounds of butterfat per cow during the year. The grain fed during the year amounts to 2,268 pounds per cow, or eight pounds each day for 285 days. The hay fed amounts to four tons per cow, or 28 pounds daily for 285 days. This ration of eight pounds of grain and 28 pounds of hay supplies digestible nutrients enough for a 1,200 pound cow producing daily 39 pounds of 4 per cent milk. The 40 acres of native pasture—mostly rough land—and 90 acres of wheat supply abundant pasture for the rest of the year.

The poultry (150 chickens) consumed 6920 pounds of grain and 2,000 pounds of mash during the year, or 46 and 13.3 pounds of each per hen. This means that considerable feed must have been picked up on the farm in the form of scattered grain, insects, and worms. Approximately 10 dozen eggs were laid per hen.

The two horses received no grain, but have two tons of hay each and considerable pasture. The tractor is used for nearly all of the farm work so that the horses are kept in good condition on this amount of feed.

The largest single item of income is milk which was sold on the basis of its butter fat content. The actual price received during 1929 was $.55 per pound of butter fat, but the outlook for prices in the near future is not very favorable so that the income was figured in this, and in the revised plan, on the basis of $.45 per pound. This makes a total of $1,224 receipts for milk. The wheat sold amounted to $944 on the basis of $.80 per bushel.

A combine and tractor are kept on this farm, and $375 was received for outside work. These large costly pieces of machinery, and the work done with them off the farm, account for the high machinery depreciation, the high repair, and the gas and oil expense.

The labor income with this organization, average yields, and estimates of probable future prices is $252. Only a small amount of family labor outside of the operator's was used on the farm.

Reorganization of the 160-Acre Farm

Although a fair net return is being obtained with the present system of farming, the owner feels that he can expand his business so as to obtain a larger net income. No additional land is available for use. Plowing up part of the 40 acres of native pasture is not feasible, partly because the land is too rough for tillable crops. Sod of this kind cannot readily be established again after being broken up. There is also a definite feeling on the part of most of the farmers in the area that too much of the native pastures have been broken up already. Putting the alfalfa and sudan grass land into wheat certainly would not pay because the hay is used on this farm and is making a larger return acre for acre than wheat. Besides experiments with continuous cropping to wheat in this area indicate a reduction in yield to about 12 bushels per acre.

The excellent returns received from the dairy cows suggests the possibility of increasing the number of cows and the amount of feed crops. In 1928, $352 worth of feed was purchased, over $200 of which was for the cows. The owner has suggested increasing the dairy herd to 15 cows. One of the three children growing up will be able to help milk. The needed barn room can be arranged with practically no additional cash outlay. The reorganization as shown in Table 36 is substantially as it was planned with the farmer. In spite of the somewhat unfavorable outlook for dairying during the next several years, it is undoubtedly the best alternative for this farmer, with his abilities, and under the conditions surrounding him. The proposed reorganization will probably take two years to complete as he prefers to raise his own cows and it will take at least a year to get the additional alfalfa into full production.

Briefly, this plan provides for 50 acres of wheat, 35 acres of feed grains, and 30 acres of alfalfa. The expected wheat yields are increased to 17 bushels. The experience of farmers in the area indicates increases in wheat yields of 33⅓ per cent for several years after alfalfa. The 35 acres of feed grains with their expected yields will produce 47,600 pounds of grain. This is sufficient to provide the 15 cows with the amounts of grain used before, the horses with 25 bushels of corn or 700 pounds each where none was provided before, the young cattle with more grain to make up for the decrease in pasture area per unit, and the poultry are provided with as much grain as before and enough corn left over to buy at least the previous amount of laying mash. Grain is allowed for the horses because there will be more horse labor with corn and a larger acreage of alfalfa than there was under the previous plan. The yield of alfalfa hay is conservative. Twenty-five acres would probably produce the 75 tons needed by the livestock.

The expenses are decreased almost by the amount of the feeds bought, the income is increased from $3,113 to $3,898 and the labor income is increased from $252 to $1,233. More family labor will be needed, however, in taking care of seven additional cows and two more head of growing stock. This has not been deducted here.

Present Organization of a Large Farm

The farmer who has nearly three quarter-sections of land in northwestern Oklahoma does not need to farm as intensively as the man who has one quarter-section of land, in order to get a fair labor income. With

wheat as the main crop, the tractor and combine have greatly increased the size of farm which can be operated to the best advantage, and have made it possible to raise wheat on new land to the exclusion of almost every other farm product, and make a fair profit doing so. By seeding some legume in the wheat and in time using mineral fertilizers, it may be possible to develop a system of farming which will keep yields of wheat up indefinitely under a one crop system. Generally, however, the growing of a legume to keep up the soil leads to the production of cattle or sheep to utilize the legume crop. Some other feed crops usually follow to maintain the livestock throughout the year, and the result is a more diversified system of farming. As a rule this does not result in a higher wage per hour than the one crop system, but, if properly managed, it will result in a higher net return for the year.

The farm shown in Table 37 grows more feed and livestock than the average farm of its size in northwestern Oklahoma. The area in crops is large enough on this farm to require the full time of the farmer and one hired man during the crop season. Consequently beef cattle and sheep, which require little labor at that time of the year, fit in better with the rest of the farming system than dairy cows.

Fifty-one acres of feed grain are grown, producing 60,800 pounds of grain. More than 50,000 pounds of corn and oats are fed to cattle, some of which have been fed to a high finish and sold to an advantage. The rest of the livestock receive small amounts of grain but have 75 acres of native pasture, 10 acres of sweet clover, 12 acres of wheat sown only for pasture, and 250 acres of the wheat sown for grain. Since some of the livestock has been sold at so much per head rather than by weight, the price per pound cannot be determined accurately.

The labor income under the present organization with average yields and expected price amounts to $610. Very little family labor is available outside of the operator's.

Reorganization of the Large Farm

Not much can be suggested in the way of improvement on the present system of farming. In most respects the organization seems to be nearly ideal for the conditions prevailing, and under the efficient management of the owner it is yielding a satisfactory net return considering the low price of wheat, the source of nearly 65 per cent of the income.

Minor changes are suggested in Table 38 which should increase the net return by about $339. The proposed changes are to increase the alfalfa acreage from 12 acres to 24, the sweet clover from 10 acres to 24, and to grow 25 acres each of corn and oats.

The number of beef cows is increased from 13 to 15, the young stock from 17 to 20, and the number of chickens from 65 to 100. The last change has already been made as the year 1929 was started with 30 chickens and ended up with 100.

The slight increase in numbers of beef cattle may seem ill-timed when one considers the prospect of declining prices of beef. On the other hand, the alfalfa and sweet clover are needed for soil improvement, and it seems logical to use them in producing livestock more economically. On the basis of somewhat rough estimates of the pounds of beef produced on this farm and several other farms in the same township, it appears that this farm, in 1929, used about 520 pounds of grain and 700 pounds of hay per 100 pounds of beef produced, and had seven acres of pasture (including wheat) per animal unit. Another farm nearby, which also produces beef, tho of less finish, used 125 pounds of grain and 1300 pounds of hay per 100 pounds of beef produced, and had only three acres of pasture per animal unit. It seems safe to assume, therefore, that by having plenty of alfalfa hay and

sweet clover pasture besides the liberal allowance of corn and oats (44,920 pounds) that farm No. 2 (Table 38) should be able to sell $1000 worth of beef annually even though the price may decline below the present level. The expected income, with the suggested system, is $5,279, and the expense $4,330, leaving a labor income of $949 compared with $610 under the system followed in 1929.

The reorganization plans above illustrate types of problems that a large number of farmers in north central Oklahoma are facing at the present time. The farmer on 160 acres of land can not do a large enough business in producing wheat alone to give him the net income which he feels is needed to maintain a satisfactory standard of living. The addition of livestock, where it is handled efficiently, makes it possible to convert legume crops needed for soil improvement, pasture, and crop residues into profitable products. On 160 acre farms the average farm family is likely to have considerable labor available above that needed for wheat production. The production of dairy and poultry products provides an opportunity for using this labor to good advantage as is shown in Farm No. 1.

A gradual change towards more dairy and poultry production on many farms is undoubtedly a practical way of increasing the net incomes of farmers who can not increase their acreage.

On the large farms of 320 to 480 acres, such as Farm No. 2, a fair income can be obtained by supplementing wheat production with kinds of livestock which do not require as much labor as dairy cattle and poultry. Beef cattle and sheep are well suited to these farms. They utilize legumes, pasture, and crop residues, and convert them into marketable products. They do not give as high returns per unit of feed as do dairy cattle and poultry, but may give as high or higher returns per unit of labor. This is usually the more important consideration on large farms where labor is likely to be scarce.

Table 35—Present Organization of Farm No. 1—160 Acres

Production and purchased				Use of crops and purchased feeds						
Land Use	Acres	Average yield	Amount	2 horses	8 cows	4 heifers and calves	1 Bull	150 Chickens	Seed	Total	Balance for sale
Wheat	90	15 bu.	1350 bu.		40 bu.			40 bu.	90 bu.	170 bu.	1180 bu.
Alfalfa	15	2½ tons	37½ tons	3	25 tons	4 tons	2 tons			34 tons	3½ tons
Sudan	10	1 ton	10 tons	1	7 tons	2 tons				10 tons	
Native pasture	40										
Farmstead and roads	5										
Insurance											
Oats			400 bu.		370 bu.	20 bu.		10 bu.		400 bu.	
Kafir			50 bu.					50 bu.		50 bu.	
Corn			25 bu.					25 bu.		25 bu.	
Poultry mash			2000 lbs.					2000 lbs.		2000 lbs.	
Dairy feed			3000 lbs.		3000 lbs.					3000 lbs.	
Cottonseed meal			1000 lbs.		900 lbs.	100 lbs.				1000 lbs.	

Summary of Incomes and Expenses

Incomes	Quantity	Price	Value
Wheat	1180 bu.	$ .80	$ 944
Alfalfa	3½ tons	10.00	35
Butterfat	2720 lbs	.45	1224
Cattle	7 head	25.00	175
Poultry	150 head	.80	120
Eggs	1200 doz.	.20	240
Combining	150 acres	2.50	375
TOTAL - -			$3,113

Feed Purchased	Amount
Oats, 400 bushels	$160
C. S. meal, 1000 lbs.	30
Dairy feed, 3000 lbs.	72
Corn, 25 bushels	20
Kafir, 50 bushels	30
Poultry mash, 2000	50
Total - - - - -	$352
Labor income - - -	$263

Expenses	*Amount*
Labor, hired	$ 160
Repairs	
Buildings	50
Machinery	110
Fences	16
Auto	200
Feed	352
Veterinary	10
Seed	20
Taxes	135
Insurance	8
Gas and oil	400
General expense	50
Depreciation	
Buildings	100
Machinery	450
Interest at 5% on investment	800
Total - - - -	$2861

Table 36—Reorganization of Farm No. 1—160 Acres

	Production and purchased			Use of crops and purchased feeds							
	Acres	Expected yields	Amount	2 Horses	15 Cows	6 Heifers and Calves	1 Bull	150 Chickens	Seed	Total	Balance for Sale
Land Use											
Wheat	50	17 bu.	850 bu.					90 bu.	50 bu.	140 bu.	710 bu.
Oats	15	40 bu.	600 bu.		500 bu.	60 bu.		10 bu.	30 bu.	600 bu.	
Barley	10	30 bu.	300 bu.		250 bu.	30 bu.			20 bu.	300 bu.	
Corn	10	25 bu.	250 bu.	25 bu.	110 bu.			25 bu.		160 bu.	90 bu.
Alfalfa	30	2½ tons	75 tons	4 tons	60 tons	9 tons	2 tons			75 tons	
Native pasture	40										
Farmstead and roads	5										
Feed Purchased											
Poultry mash			2000 lbs.					2000 lbs.		2,000 lbs.	

Summary of Incomes and Expenses

Incomes	Quantity	Price	Value	*Expenses*	*Amount*
Wheat	710 bu.	$.80	$ 568	Labor, hired	$160
Butterfat	5100 lbs	.45	2,295	Repairs	
Cattle	12 head	25.00	300	Buildings	50
Poultry	150 head	.80	120	Machinery	110
Eggs	1200 doz.	.20	240	Fences	24
Combining	150 acres	2.50	375	Auto	200
				Feed	50
Total			$3,898	Veterinary	16
				Seed	30
				Taxes	135
				Insurance	10
				Gas and oil threshing	400
				General farm expense	50
				Depreciation	
				Buildings	100
				Machinery	450
				Interest at 5%	380
Labor income			$1,233	Total	$2,665

Table 37—Present Organization of Farm No. 2—442 Acres

	Production and purchased			Use of crops and purchased feeds							
	Acres	Average yields	Amount	4 Horses	14 Cows* 17 Young Cattle	55* Ewes	60 Lambs	65 Chickens	Seed	Total	Balance for Sale
Land Use											
Wheat	250	18 bu.	4500 bu.					25 bu.	250 bu.	275 bu.	4225 bu.
Corn	28	20 bu.	560 bu.		485 bu.	30 bu.	20 bu.	25 bu.		560 bu.	
Oats	23	40 bu.	920 bu.	200	580 bu.	60 bu.	30 bu.		50 bu.	920 bu.	
Sudan	3	2 tons	6 tons	1	5 tons					6 tons	
Alfalfa	12	3 tons	36 tons	3	30 tons	3 tons				36 tons	
Wheat pastures	12										
Sweet clover	10										
Fallow	10										
Native pasture	75										
Farmstead and roads	19										
Feed Purchased											
Oats			182 bu.		182 bu.					182 bu.	

*The breeding herd or flock including 1 male.

Summary of Incomes and Expenses

Incomes	Quantity	Price	Value	*Expenses*	*Amount*
Wheat	4225 bu.	$.80	$3380	Labor, hired	$390
Dairy products			19	Repairs	
Cattle			782	Machinery	150
Sheep			594	Fences	15
Wool			106	Auto	200
Poultry			16	Feed	73
Eggs	336 doz.	.20	67	Veterinary an other livestock expenses	50
Total			$4964	Seed	26
				Taxes	304
				Insurance	24
				Gas and oil (farm)	164
				Threshing	120
				General farm expenses	88
				Depreciation	
				Buildings	200
				Machinery	400
				Interest at 5% on investment	2150
Labor income			$ 610	Total	$4354

Table 38—Reorganization of Farm No. 2—442 Acres

	Production and purchased			Use of crops and purchased feeds							
	Acres	Expected yields	Amount	4 Horses	16 cows* 20 Young Cattle	55 ewes*	60 Lambs	100 Chickens	Seed	Total	Balance for Sale
Land Use											
Wheat	250	18 bu.	4500 bu.					50 bu.	250 bu.	300 bu.	4200 bu.
Corn	25	20 bu.	500 bu.		425 bu.	30 bu.	20 bu.	25 bu.		500 bu.	
Oats	25	40 bu.	1000 bu.	200 bu.	660 bu.	60 bu.	30 bu.		50 bu.	1000 bu.	
Alfalfa	24	2 ½ tons	60 tons	6 tons	48 tons	4 tons	2 tons			60 tons	
Sweet Clover	24	pasture									
Native Pasture	75										
Farmstead and roads	19										

*The breeding herd or flock including 1 male.

Summary of Incomes and Expenses

Incomes	Quantity	Price	Value	*Expenses*	*Amount*
Wheat	4200 bu.	$.80	$3360	Labor, hired	$394
Dairy products			19	Repairs	
Cattle			1000	Machinery	150
Sheep			594	Fences	15
Wool			106	Auto	200
Poultry (50 hens)				Feed, Poultry	30
(50 young roosters)			80	Veterinary and other livestock	
Eggs	600 doz.	.20	120	expenses	50
				Seed	26
Total			$5279	Taxes	304
				Insurance	24
				Gas and oil (farm)	164
				Threshing	125
				General farm expenses	88
				Depreciation	
				Buildings	200
				Machinery	400
				Interest at 5% on investment	2160
Labor income			$ 949	Total	4330

APPENDIX

Table A—Estimated Receipts and Expenses per Cow Producing 250 Pounds of Butterfat per year—North Central Oklahoma

Feed	Cost	
EXPENSES		
Grain, 1800 pounds	$25.00	
Hay, 1½ tons	15.00	
Fodder or silage, 2 tons	10.00	
Pasture, 250 days	10.00	
TOTAL	$60.00	
Investment and Cash Costs		
Interest on $100 cow at 6%	6.00	
Depreciation on $100 cow	8.00	
Bull service	5.00	
Interest and depreciation on $50 investment in dairy buildings and equipment	5.00	
Veterinarian	1.00	
TOTAL	$25.00	
Cost of keeping cow one year except labor		$85.00
CREDITS		
Skim Milk, 5000 pounds at 30 cents per cwt.	$15.00	
Calf at birth value	5.00	
Manure, 10 tons at $1.00	10.00	
Total credits except butterfat	$30.00	

Labor requirement estimated at 150 hours per cow per year.

Returns per hours of labor spent on dairy cow with butterfat at average annual price of:

30 cents per pound	20 cents per hour
40 cents per pound	30 cents per hour

The above figures may be taken as minimum standards for good producers. Costs and profits will vary from the above with changes in prices of both cost items and the products sold.

Table B—Estimated Receipts and Expenses of a Hen Producing 12 Dozen Eggs per Year

Feed	EXPENSES Cost	
Grain, 40 pounds	$ .60	
Mash, 30 pounds	.60	
Skim milk, 60 pounds at 30 cents	.18	
Shell, etc.	.12	
TOTAL	$1.50	
Investment and Cash Costs		
Interest on $1.00 hen at 6%	$ .06	
Death loss at 11%	.11	
Depreciation on hen during year	.45	
Poultry house and equipment $3 investment, interest and depreciation at 10%	.30	
Miscellaneous	.08	
TOTAL	$1.00	
Cost of keeping hen one year except labor		$2.50
Returns per hour of labor (estimated labor requirements two hours per hen)		
Eggs selling at average annual price of:		
25 cents per dozen	25 cents per hour	
30 cents per dozen	55 cents per hour	

The above figures refer only to the laying flock. Additional profits or losses might be possible by including the items for the raising of young stock and the production of poultry for meat. These data represent minimum requirements; good poultry men with better than average markets for their produce should exceed them.

FARM ACCOUNTS

Many of the farmers in both Blaine and Garfield counties who cooperated in supplying the basic information for this publication kept farm account books in 1928 under the direction of T. S. Thorfinnson, Farm Management Specialist of the Oklahoma Extension Service. This recording has been continued this past two years under the direction of Dr. Peter Nelson, Extension Economist.

A simple record of opening and closing inventories, cash receipts and expenses, crops grown and feeds fed on the farm, provides necessary basic information for intelligently planning a more profitable organization and operation of the farm business. A clear knowledge of the facts of the farm business and intelligent planning on the basis of such knowledge leads to larger incomes and greater satisfactions in living on the farm.