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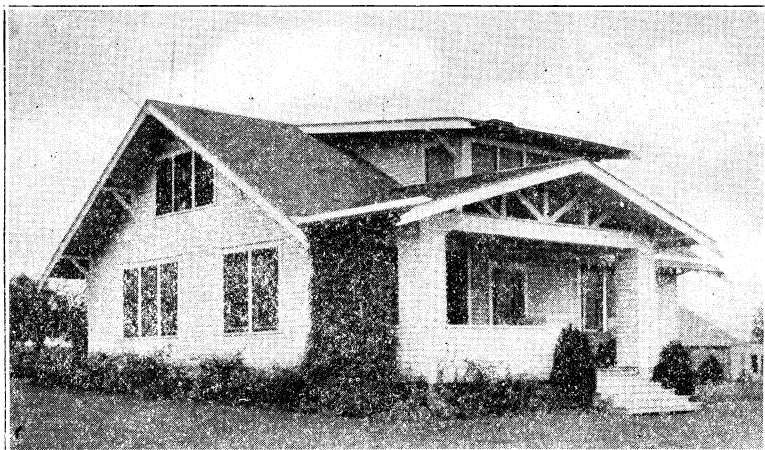
STILLWATER, OKLAHOMA

IN COOPERATION WITH THE UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS
DIVISION OF FARM MANAGEMENT AND COSTS

Farm Production Costs
in Oklahoma
1931

P. H. STEPHENS

PROFESSOR OF AGRICULTURAL ECONOMICS



A dividend of good farm management.

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FARM PRODUCTION COSTS IN OKLAHOMA, 1931¹

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INTRODUCTION

This is the first publication of the Oklahoma Experiment Station showing detailed and complete costs of production of crops and livestock products. The data presented herein were gathered and analyzed with the idea that information concerning the relative costs of production of various farm products under actual farm conditions would be useful to the farmers of this State in planning their farming operations for more economical production and hence greater farm profits.

Scattered surveys of farm production costs and farming systems in Oklahoma have been made during the past 20 years. Notable among these are the cost-of-production studies made by representatives of the United States Department of Agriculture. These include a series of studies made by Charles F. Hoke, now of Enid, on a variety of commodities from 1916 to 1922, some of which appeared as mimeographed reports and are not now available. The first systems-of-farming study from the Oklahoma Experiment Station appeared a year ago.²

A sustained interest in farm accounting and farm record keeping among Oklahoma farmers was initiated under the direction of T. S. Thorfinson, Extension Economist, from 1926 to 1929. Several hundred farmers throughout the State keep the Oklahoma Farm Account Book each year now under the direction of Dr. Peter Nelson, Extension Economist, as a means of studying their farm businesses and as a guide in planning more profitable farm organizations.

The Need of Cost-of-Production Data

Research and extension workers have continually called attention to the lack of adequate information about current or average production costs and physical production requirements under actual farm conditions which has been a serious handicap in interpreting the most profitable farm practices and methods of production. On account of this lack of adequate local information, extension workers in the field and instructors in college classrooms have oftentimes used data from other states or experiment station data which were not strictly applicable to the conditions found on farms in this State. Farmers are continually making inquiries of the college and extension staff concerning the production requirements for various crops and kinds of livestock, relative production costs under various methods, and the profitability of various farm practices.

¹Grateful acknowledgement is made to the several hundred Oklahoma farmers whose hearty cooperation in supplying information on their own farm businesses has made possible this publication. Acknowledgement is also made for the financial assistance and cooperation of the Division of Farm Management and Costs of the Bureau of Agricultural Economics, United States Department of Agriculture, and the Extension Service of Oklahoma Agricultural and Mechanical College in collection of the data presented herein. Dr. Peter Nelson, Extension Economist; Dan Arnold, county agent of Garfield county; E. M. Sledge, county agent of Craig county, and E. H. Hildebrand, county agent of Mayes county, assisted in the supervision of the project. Berkey O. Means was employed as the field assistant in Garfield county and Archie Leonard served in a like capacity in the Craig-Mayes area. B. H. Thibodeaux of the Bureau of Agricultural Economics, United States Department of Agriculture, gave expert assistance in the supervision of the project and tabulation of production costs. Dr. C. L. Holmes, Chief of the Division of Farm Management and Costs, Bureau of Agricultural Economics, made helpful suggestions in the completion of the manuscript. Responsibility for the interpretation of the results rests with the author.

²P. H. Stephens and Emil Rauchenstein, *Systems of Farming in Oklahoma*, No. 1, Wheat Farming in North Central Oklahoma, Oklahoma Experiment Station Bulletin No. 199.

Areas Studied and Methods of Collecting Data

A start toward securing information on Oklahoma farm production costs was made by the Department of Agricultural Economics of the Oklahoma Agricultural and Mechanical College early in 1930. More than 200 farmers were interviewed on their farms in Tillman and Washita counties. Data were collected on each farm business for the year 1929. Detailed information on the costs of producing cotton was obtained. This survey was repeated on 87 of the Tillman county farms in the spring of 1932. The information concerning cotton production costs gathered in these two surveys is presented in Part IV of this bulletin.

In the fall of 1930 the cooperation of 61 farmers in Garfield county and 53 in the Craig-Mayes county area was secured in keeping farm account books and supplying the necessary information on crop and livestock production requirements, particularly the feed, seed, and labor used on their farms. The Oklahoma Farm Account Book kept by each farmer gave complete information as to opening and closing inventories and cash receipts and expenses. The detailed information as to production requirements of the various crops and livestock was obtained by the field men on quarterly visits to each farm. Parts I, II and III of this publication report the findings as to production costs of the major farm products in these two areas in northern Oklahoma during the year 1931. A comprehensive study, investigating the effects on farm profits of various methods of production and the productive organization of farms, is planned to follow the completion of three years of work on this project.

Limitations in the Use of Cost-of-Production Data

It is recognized that cost of production data for a single year do not furnish, in all cases, an entirely satisfactory basis for accurately determining relative costs because of deviations from normal in climatic conditions and in price relationships. However, when allowance is made for these variations from normal in the 1931 data, it is thought that the cost of production figures, and particularly the physical quantities of labor, feed, power and other production requirements, when interpreted on the basis of later current prices, may serve a very useful purpose in guiding farmers toward lower production costs and a more profitable organization of their farm businesses. Cost-of-production data are subject to the many vagaries of the human mind, and the costs presented herein are but for a single year and hence are biased to the extent that natural and economic conditions were fortuitous or disadvantageous. In many instances the number of farms in a particular group was small, and because of this fact such groups may not represent the true average of conditions generally. Many of the allocations of costs and prices of the factors of production had to be, of necessity, arbitrary.

Labor Costs

A rate of 16 cents per hour of man labor was used in computing production costs on northern Oklahoma farms in 1931. A rate of 15 cents per hour was used on the cotton farms in southwestern Oklahoma in 1931 and 25 cents in 1929. The average rate of farm wages in Oklahoma has decreased 50 per cent in the past four years. (Table I.) The rates used in computing costs represent the actual costs of labor as nearly as it was possible to ascertain such figures. The rate of wages used was slightly higher than the average rate paid in Oklahoma to hired laborers; however, much of the labor on these farms was performed by the farmers themselves and hence was perhaps worth more than the current rate of hired laborers. Also the same rate of labor was charged for work performed in the rush of the harvest season as for that done in slack times. This was necessary if comparisons between enterprises are to be made on a comparable basis of profitableness as to income or profit per hour of labor expended.

TABLE I.—Oklahoma Farm Wages per Day Without Board*

Months	1929	1930	1931	1932
January	\$2.15	\$2.00	\$1.50	\$1.10
April	1.95	1.95	1.40	1.05
July	2.05	1.90	1.35	1.00
October	2.20	1.70	1.20	----
Average	2.09	1.89	1.36	----

*From CROPS AND MARKETS, United States Department of Agriculture.

It should be emphasized that the above mentioned labor rates are not regarded as fair or adequate returns for the labor of Oklahoma farmers. No implication of justice or adequacy is made. The rates are simply the costs of labor as reflected in the wages actually paid currently for similar work as reported by farmers throughout the State.

Land Charges

The charge for the use of land was computed as 5 per cent of the average value of land designated by the individual farmers in their farm account inventories. This was more than the amount actually paid by some tenants and less than the amount of interest paid on the mortgage by some landowners. It represents a fair rate of return on a land valuation considerably lower than that prevailing in these areas three years ago. Costs for the other items of production were at the prevailing market prices. These included such items as repairs, twine, threshing and feed purchased. Credits were allowed for products used in the home or on the farm at fair market prices less the cost of marketing, at least in so far as these current farm prices could be ascertained. These credit items included dairy and poultry products used in the home, and skim milk, straw, and pasturage used in livestock production.

Physical Requirements More Useful Than Cost Figures in the Long Run

Cost of production figures for any crop or livestock product in a given year and on a particular farm are largely influenced by the yields obtained in that particular year and the prices of the various input items prevailing at that time. Profits per acre or other unit of production are, in addition to the above mentioned factors, influenced greatly in years of radical price change by fluctuations in the sales price of products sold. Therefore, the physical requirements of production in terms of hours of man labor, horse labor, equipment used and quantities of seed, feed and other material requirements, because they are not subject to these fluctuations, are of more importance and of greater usefulness in determining the relative profitability of the various enterprises in later years than are the figures of current costs and profits in terms of dollars and cents.

Some considerable variations in the physical production requirements of labor and feed were present between the various farms in this investigation due to differences in the production practices followed, sizes of the producing units, the equipment used, the responsiveness of the various types of soil, the quality of livestock kept and the individuality of the farmers as managers. However, the average quantities of labor, seed, and feed used in production, as shown in the following pages, may be charged at the current rates later prevailing and a worthwhile measure of average cost obtained. The physical requirements presented herein may be taken as standards of efficient operation and production. Farmers using superior methods of production, better than average livestock, or the best of mechanical equipment

should expect to obtain greater efficiency than that shown by the average farmer in this investigation in 1931.

Weather Conditions Prevailing in 1931

As shown in Table II, the annual precipitation was below normal in 1931 and the annual temperature above normal in both the Garfield and the

TABLE II.—Weather at Vinita and Enid, Oklahoma, 1931.

	VINITA, CRAIG COUNTY				ENID, GARFIELD COUNTY			
Number of year's records	28				31			
Altitude, elevation, feet	702				1269			
Month	PRECIPITATION INCHES		TEMPERATURE DEGREES		PRECIPITATION INCHES		TEMPERATURE DEGREES	
	Average 1931	Departure from normal	Average 1931	Departure from normal	Average 1931	Departure from normal	Average 1931	Departure from normal
January	0.85	-1.07	40.0	+3.9	0.82	-0.16	41.7	+5.5
February	2.41	+0.73	46.0	+6.9	1.12	-0.07	47.4	+8.9
March	1.98	-1.64	44.0	-5.7	3.43	+2.00	44.2	-5.8
April	3.14	-1.03	56.2	-2.7	2.68	-0.68	56.2	-2.3
May	3.36	-2.23	64.2	-2.4	4.45	+0.23	64.9	-2.4
June	3.71	-1.39	79.0	+3.2	1.78	-2.34	79.9	+2.7
July	6.80	+2.98	82.4	+2.9	1.92	-0.78	84.0	+2.2
August	4.20	+0.19	77.0	-2.4	2.07	-1.41	80.6	-0.9
September	3.06	-0.06	78.3	+4.8	0.99	-2.32	82.3	+8.4
October	5.48	+1.94	66.4	+6.2	2.81	-0.27	67.6	+7.3
November	6.11	+3.06	55.8	+6.1	3.35	+1.57	52.8	+3.7
December	0.77	-1.90	45.6	+7.4	0.69	-0.46	44.1	+7.5
TOTAL	41.87	-0.42	61.2	+2.4	26.11	-4.69	62.1	+2.9

Craig-Mayes areas. The summer drought of 1931 was particularly severe in Garfield county and had the effect of reducing the yields of row crops and alfalfa to figures much below average. On the other hand, the yield of winter wheat was much above average, 20.4 bushels on the farms under investigation, due to the abundant rainfall between seeding time in 1930 and the harvest in June, 1931. Yields in the Craig-Mayes area were generally affected adversely by the deviations from normal weather conditions prevailing that year.

Low yields per acre, such as those generally obtained in Oklahoma in 1931 for all crops except wheat and oats, have the effect of lowering the per acre costs of crops only to the extent of slightly decreasing harvesting and marketing costs and of increasing greatly the costs per bushel or ton where the decrease in yield is marked.

Livestock production was affected adversely by the extreme heat of early summer in both areas; however, the winter, spring and fall months were generally more mild than usual. The principal adverse effect of weather upon livestock in 1931 in both of these areas was indirect; the condition of pasture, a reflection largely of weather conditions, was much below normal, the lowest in Oklahoma on July first in recent years.

Economic Conditions in 1931

Farmers in 1931 faced an economic situation that practically precluded profitable production. The prices of farm products fell drastically during the year—almost continually except for a slight rise in wheat prices in the late fall. Livestock prices, particularly those of eggs, poultry and butterfat, held up much better than grain prices. The prices of commodities used in farm production fell in price but not proportionately to the prices of farm products. In order to make the best of this strained economic situation, farmers eliminated all unnecessary cash expenditures. Less than normal replacements and repairs were made on farm equipment and buildings. The farms were made as nearly self-sufficing as possible.

In spite of these efforts the average farmer of the group in Garfield county keeping farm account books lacked \$914 of having anything left as pay for his labor. Only one farmer in ten earned a plus labor income after paying his farm business expenditures and 5 per cent interest on the farm investment. The losses in the Craig-Mayes area were less than in Garfield county, primarily because of the smaller farm investments and the greater dependence upon livestock; but still they averaged \$418 per farm. These losses did not include the decreases in land values, which were considerable. Land was inventoried in the 1931 Farm Account Books at approximately one-third less than in 1929.

Undoubtedly the depressed prices of farm products had some effects upon the farm practices followed in 1931. Cash expenditures were cut and there was a tendency for less intensive operation than formerly when farm prices were more favorable. However, the change in the physical requirements of crop and livestock production can be altered to only a slight extent. The major effect upon farming costs of the drastic decrease in farm income was in the lowering of first, the inventory valuations placed upon land, livestock and equipment and, second, the rate of wages paid hired labor and given as the value of the operator's labor and that of his family.

PART I.

LIVESTOCK PRODUCTION COSTS

Livestock has been increasing in importance on Oklahoma farms in recent years. The change toward greater emphasis upon livestock enterprises has been due primarily to economic reasons—greater relative profitability either directly or indirectly. Livestock are kept on many farms as a means of providing profitable employment in seasons of the year when crop production is impossible; the hours spent in livestock production sometimes do not earn as high a wage as those spent in crop production, but



Efficient converters of farm wastes into a salable product.

where the total hours of labor per year are increased sufficiently the total farm income may be thereby increased. On some farms, also, livestock are kept as a means of maintaining the fertility of the soil and of using otherwise waste products. For these reasons, the keeping of livestock is likely to increase in many sections of Oklahoma as more permanent systems of farming are developed.

The decline in livestock prices during 1931 was considerable; although in many instances it was less than that in crop prices. Livestock was generally more profitable than crop production. In fact, as shown in the following tabulations, during 1931 the hours spent in dairy and poultry production returned a much higher wage than the net return for labor expended in the production of crops.

Labor Requirements in Livestock Production

The hours of man labor spent per work horse, milk cow, and per 100 hens in Garfield and in the Craig-Mayes area are shown in Table III. Slightly more than 40 hours of man labor were used per horse in both

TABLE III.—Distribution of Man Labor on Livestock, 114 Oklahoma Farms, 1931.

Month	HOURS OF MAN LABOR PER MONTH					
	GARFIELD COUNTY			CRAIG-MAYES AREA		
	Per work horse or mule	Per milk cow	Per 100 hens	Per work horse or mule	Per milk cow	Per 100 hens
January	2.5	9.3	15	3.5	5.7	12
February	2.5	8.8	15	3.7	6.6	12
March	2.8	9.3	20	3.8	6.3	15
April	4.3	8.6	22	3.8	5.9	16
May	4.2	8.4	18	3.8	6.4	15
June	4.5	7.9	13	3.8	6.4	12
July	4.4	8.0	11	3.7	6.3	13
August	4.0	7.5	10	3.7	6.4	12
September	3.8	7.7	10	3.6	6.2	10
October	3.6	8.2	10	3.6	6.0	10
November	2.8	8.3	12	3.6	5.6	11
December	2.6	9.0	13	3.5	6.2	12
Total hours per year per unit	42.0	101.0	169.0	44.0	74.0	150.0
Average minutes per day per unit	6.9	16.6	27.8	7.2	12.2	24.7

areas in taking care of the farm work stock. The distribution of man labor in the different months of the year was quite uniform in the Craig-Mayes area, varying from 3.5 hours per horse per month in December and January to 3.8 hours in the spring months and totaling 44 hours per horse for the year. The hours spent per horse in Garfield county varied from 2.5 in the winter months to 4.5 in June and totaled 42 hours per horse for the year.

An average of 101 hours of man labor was spent per milk cow in Garfield county, while in the Craig-Mayes area the total was only 74 hours of man labor per year per cow. From the distribution of labor it is apparent that a somewhat different system of dairying was followed in the two areas.

In Garfield county more winter dairying is practiced as a means of utilizing the large amounts of wheat pasture available, while in the Craig-Mayes area most of the milk is produced on native grass pasture in the spring and summer months.

The hours of labor spent in caring for poultry averaged 169 hours per 100 hens in Garfield county and 150 hours in the Craig-Mayes area. The labor requirements are particularly heavy during the hatching and rearing season in the early spring months. In computing these labor requirements, young stock under six months of age was figured at one-half the requirements of mature stock, that is, two young chicks as equivalent to one hen.

Dairy Production Costs

Quantities of Feed Used and Feed Costs per Cow

At the prices prevailing in 1931 the average annual cost of feed per dairy cow in Garfield county was \$30.96. This amount was divided approximately equally between the costs of concentrates, hay and other roughage, and pasture. (See Table IV.) In the Craig-Mayes area the annual feed costs per cow amounted to only \$22.19. Hay and pasture costs were considerably lower in this area than in Garfield county.

TABLE IV.—Average Quantity and Costs of Feeds Fed per Cow, 60 Oklahoma Dairy Herds, 1931.

	GARFIELD COUNTY		CRAIG-MAYES AREA	
	Pounds	Value	Pounds	Value
Feeds				
Concentrates				
Oats	810	\$6.74	687	\$4.44
Wheat	246	2.03		
Corn			405	2.64
Other grains	87	.71	157	1.29
Soybeans			33	.27
Protein supplement	52	.65	33	.62
Total concentrates	1203	\$10.13	1320	\$9.26
Roughages				
Legume hay	1061	\$6.67		
Other hay	1133	3.76	2600	\$3.09
Total Roughages	2194	\$10.43	2600	\$6.00
Pasture (days)	326	10.40	272	\$3.93
Total feed cost per cow		\$30.96		\$22.19

Slightly more grain, 1320 pounds of total concentrates, was fed per cow in the Craig-Mayes area than in the Garfield county area where an average of only 1203 pounds of concentrates was fed per cow. More hay was fed in the Craig-Mayes area than in the Garfield area, 2600 pounds as compared with 2194 pounds per cow. However, nearly one-half of the hay fed in the Garfield county area was alfalfa. Offsetting these greater quantities of feed fed in the northeastern districts, the Garfield county farmers had their cows on pasture 326 days per year as compared with only 272 days in the Craig-Mayes area.

Butter Production Costs

Detailed dairy records were obtained on 28 Garfield county farms and 32 Craig-Mayes area farms on which dairying was a considerable source of income. Production of butterfat on these farms was above the average in the State, totaling 205.9 pounds per cow in Garfield county and 164.4 in the Craig-Mayes area.

The average annual cost of maintaining a cow was \$60.92 per cow in Garfield county and \$44.90 in the Craig-Mayes area. (See Table V.)

TABLE V.—Cost of Butterfat Production, 60 Oklahoma Farms, 1931.

	Garfield County	Craig-Mayes Area
Number of farms	28	32
Average number of cows per farm	8.7	10.5
Average value per cow	\$47.02	\$35.85
Average pounds of butterfat per cow	205.9	164.4
Cost per Cow per Year:		
Man labor	\$16.16	\$11.83
Interest at 5% on cow investment	2.35	1.79
Depreciation on cow investment	3.29	2.51
Taxes	.48	.46
Shelter (Barn cost)	4.48	3.97
Dairy utensils and supplies	1.58	.97
Feed	30.96	22.19
Miscellaneous cost	1.62	1.18
Total cost per cow - - -	\$60.92	\$44.90
Credits per Cow per Year:		
Products sold	\$43.98	\$27.73
Products used in the home	9.46	9.27
Products used on the farm	10.51	10.70
Total credit per cow - - -	\$63.95	\$47.70
Net cost per pound of butterfat	\$.25	\$.22
Net profit per cow	3.03	2.80

The return per hour of labor was 19 cents in Garfield county and 20 cents in the Craig-Mayes area. The inverse relationship between profit per cow and profit per hour in the two areas was due to the fact that even with the smaller return per hour of labor in Garfield county, a sufficiently greater number of hours of labor was used per cow to earn a slightly larger total profit.

Feed in both of these areas made up approximately one-half of the total costs. The next most important item was man labor, which approximated one-fourth of the total cost in each instance. The assumption is that the other items of interest, depreciation, taxes, shelter, equipment and miscellaneous costs made up the remaining one-fourth of the total expenses. No charge was made for bull service and nothing was allowed for the value of the calf at birth; one offsets the other.

The total credits per cow per year were in much the same proportion as the total costs per cow in the two areas. The total credits per cow in Garfield county were \$63.95 and in the Craig-Mayes area \$47.70. The value of products sold per cow was much higher in Garfield county than in the Craig-Mayes area, because considerable amounts of the production in Garfield county were sold in the form of fluid milk while in the Craig-Mayes area the dairy sales were all in the form of sour cream or butter. The

value of butter, cream and whole milk used in the home amounted to slightly more than \$9 annually per cow in both areas. Credits for skim milk and manure amounted to slightly more than \$10 per cow per year in both areas.

The net cost per pound of butterfat was 25.2 cents in Garfield county and 21.7 cents in the Craig-Mayes area. (See Table V.) The reason for the higher cost in Garfield county was the additional labor performed in delivering the whole milk and the more expensive feeding practices followed on the farms producing whole milk. Because of the higher prices received for the butterfat sold in the form of whole milk, the profit per cow was slightly higher in Garfield county than in the Craig-Mayes area, \$3.03 as compared with \$2.80; or, stated in another way, with prices of feed and dairy products as they were in 1931, the farmers in Garfield county earned approximately \$.19 per hour and those in the Craig-Mayes area approximately \$.20 per hour for the labor expended in dairy production. These were indeed encouraging returns when most other lines of farm production were showing large losses.

Distribution and Sources of Income

On 28 farms in Garfield county on which an average of 8.7 cows were kept the average income from dairying was \$554.86 per farm. Of this,

TABLE VI.—Distribution and Sources of Income on 60 Oklahoma Dairy Farms, 1931.

Items	Garfield County			Craig-Mayes Area		
	Amount	Price (cents)	Value	Amount	Price (cents)	Value
Number of herds			28			32
Average number of cows per herd			8.7			10.5
Average sales per farm						
Butterfat, pounds	1031	22.5	\$232.35	1243	23.4	\$290.28
Whole milk, pounds (butterfat basis)	334	44.7	149.25			
Total sales per farm -	1365	28.0	\$381.60	1243	23.4	\$290.28
Average home use per farm						
Butter, pounds	95	18.4	\$ 17.46	145	19.3	\$ 27.99
Cream, gallons	47	71.5	33.62	36	74.0	26.63
Milk, gallons	333	9.3	30.97	447	9.5	42.46
Total home use per farm - - - -			\$ 82.05			\$ 97.08
Average farm use per farm						
Whole milk fed to livestock, gallons	194	9.3	18.04	265	9.5	25.18
Skim milk fed to livestock, gallons	3145	1.5	47.17	3690	1.5	55.35
Manure, tons	52	50.0	26.00	63	50.0	31.50
Total farm use per farm - - - -			\$ 91.21			\$112.03
Total dairy income per farm - - - -			\$554.86			\$499.39

\$381.60 was from cash sales of whole milk and sour cream. The remainder was credited for dairy products used in the home, whole and skim milk fed to livestock, and manure. (See Table VI.) In the Craig-Mayes area the herds were slightly larger, averaging 10.5 cows per herd; but, because the production per cow was lower and the dairy cash sales were all in the form of sour cream, the dairy income per farm was slightly less than in Garfield county, \$499.39. Of this, \$290.28 was from butterfat sales. The average price received for butterfat in the Craig-Mayes area in 1931 was 23.4 cents per pound, while in Garfield county approximately one-third of the dairy sales were in the form of whole milk which calculated on a butterfat basis sold on the average for 44.7 cents per pound. Sour cream sold in Garfield county for an average of 22.5 cents per pound of butterfat. The dairy products used in the home were charged at sour cream prices for the butterfat content plus the value of the skim milk which was figured at 1.5 cents per gallon. The above figures indicate that the dairy enterprise was of sufficient importance on these farms to warrant careful study of the factors of efficiency in the enterprise and of the means whereby the dairy production could be made more profitable.

Factors Affecting Dairy Costs

Labor Requirements

It was found that the number of cows maintained in the dairy herd had a considerable effect upon the hours of man labor expended per cow annually. In Garfield county, increasing the average number of cows in the herd from five to ten decreased the annual requirements per cow by 17 hours—from an average of 118 hours per cow to 101. (See Table VII.) In the Craig-Mayes area those farmers who had an average of 10.3 cows per herd on an average did 67 hours of labor annually per cow, while those whose herds averaged 5.2 cows did an average of 98 hours. Thus the small herds required 31 hours more per cow, an increase of one-half over the labor requirements per cow in the larger herds.

TABLE VII.—Number of Cows per Farm as Affecting Hours of Man Labor per Cow and per Pound of Butterfat in Garfield County and the Craig-Mayes Area, 1931.

Number of farms	COWS PER FARM		Hours of man labor per cow
	Range	Average	
Garfield County:			
4	6 and less	5.0	118
13	6.1- 9.0	7.7	100
6	9.1-12.0	10.0	101
5	12.1 and over	12.7	85
Craig-Mayes Area:			
7	6 and less	5.2	98
10	6.1- 9.0	7.2	82
7	9.1-12.0	10.3	67
3	12.1 and over	22.3	59

Handling of several of the large herds, those over nine cows, in the Craig-Mayes area was somewhat different from the other groups. In these large herds most of the milk was produced on summer pasture, little grain was fed and therefore little labor was expended in caring for the cows. As will be shown later this extensive method of handling dairy cattle in the Craig-Mayes area was very economical and productive of large returns per hour of labor expended even though the production per cow was low.

Pounds of Concentrates Fed per Cow

Considerable variation was found in the amount of grain and other concentrates fed per cow in the various herds. Differences in the quality of animals in the various herds and in other factors affecting production and costs made it impossible to draw very definite conclusions as to the optimum amount of grain fed in these herds. In Garfield county butterfat was produced at the lowest cost per pound where less than the average amount of grain was fed, but the greatest profit per cow and greatest return per hour of man labor resulted where from 1100 to 1400 pounds of grain were fed per cow. That is, the total profits were increased so long as the increase in production more than paid for the increased feed costs. (See Table VIII.) Farmers having a whole milk market could afford to feed much more heavily than those selling sour cream.

TABLE VIII.—Pounds of Concentrates Fed per Cow as Affecting Production of Butterfat per Cow and Cost per Pound in Garfield County and the Craig-Mayes Area, 1931.

No. of farms	CONCENTRATES PER COW (POUNDS)		Cows per farm	Production per cow (pounds)	Cost per pound of butterfat (cents)	Profit per cow	Returns per hr. of man labor (cents)
	Range	Average					
Garfield County							
7	Less than 750	496	8.9	176.5	24.29	\$-3.29	12.3
7	750-1099	921	9.3	186.4	23.24	-1.26	14.6
7	1100-1399	1281	7.4	237.7	24.51	4.48	20.6
6*	1400 or more	1973	8.5	230.0	25.55	-2.74	13.7
Craig-Mayes Area							
8	Less than 1000	613	16.5	121.9	18.16	\$ 6.35	29.6
8	1000-1399	1242	8.2	168.1	24.81	-2.87	12.9
8	1400-1649	1542	8.0	176.2	21.78	2.72	19.5
8	1650 or more	2407	9.3	226.7	23.18	.66	16.6

*One unusually profitable retail whole milk dairy herd was left out of this group.

In the Craig-Mayes area the lowest production costs and greatest profit per cow and return per hour of man labor were obtained in the herds where little grain was fed, less than 1000 pounds per cow. In other words, the most economical production was that produced on pasture. Heavy grain feeding for winter production was not as profitable as summer dairying. In both areas the feeding of very large amounts of grain, one ton or more per cow, was not profitable. This problem of the most profitable rate of feeding dairy cows is a continuous one with dairymen because the prices of feed and of dairy products fluctuate in their relationship to one another. When feed is very cheap relative to dairy products, heavier feeding is more profitable than when the reverse is true. On many farms a further factor in the problem is the type or system of dairying that best fits into the rest of the farm organization and therefore adds the most to the net farm income. On some farms, where there is little summer pasture, the purpose of dairying is perhaps primarily to provide winter employment and a use for otherwise waste wheat pasturage, so that winter dairying may answer these requirements best. On other farms, where there is an abundance of cheap grass in the spring and early summer months, the less intensive system of producing butterfat on pasture may be productive of the largest net income.

Production of Butterfat per Cow

Superior innate production capacity, whether in the form of a superior animal, good seed, or a fertile soil, is usually cheap compared with inferior capacity. A 300-pound dairy cow is not usually valued at a sufficiently high figure to really discount her advantage over the average individual. Likewise the better land in a community usually is not priced sufficiently above the average but what the crops produced on it will pay for the land in less time than the average. This under-valuation of the superior instruments of production is illustrated in Table IX. A part of the difference between

TABLE IX.—Production of Butterfat per Cow as Affecting Feed and Net Cost per Pound of Butterfat, Returns to Man Labor, and Profit per Cow in Garfield County and the Craig-Mayes Area, 1931.

Number farms	Cows per farm	PRODUCTION PER COW		Net cost per pound butterfat (cents)	Returns to man labor per hour (cents)	Profit per cow (dollars)
		Range (pounds)	Average (pounds)			
Garfield County						
7	10.0	174 or less	151.7	27.4	6.9	-7.81
7	8.5	175-209	188.2	25.5	13.7	-2.13
6*	9.8	210-249	219.8	24.3	19.8	3.96
7	7.4	250 or more	278.7	21.5	20.6	5.60
Craig-Mayes Area						
8	15.5	134 or less	116.9	19.9	24.1	3.93
8	8.8	135-174	147.4	24.8	13.8	-1.69
8	8.0	175-209	187.6	24.4	14.5	-1.43
8	9.6	210 or more	235.9	19.6	24.6	8.19

*One unusually profitable retail whole milk dairy herd was left out of this group.

the various groups of cows was to be found in the variations in the amounts of feed fed and other production practices. On the other hand, a large part of the difference was in the productive ability of the cows themselves. The farmers having the high producing cows did not place an inventory valuation upon their dairy herds sufficiently high to discount entirely the greater profitableness of these animals as compared with the average or inferior producers.



Poultry and dairy were profitable farm enterprises even in 1931.

In the Garfield county groups the cows that averaged 152 pounds of butterfat per cow had costs averaging 27.4 cents per pound of butterfat while those averaging 278.7 pounds of butterfat had costs of 21.5 cents per pound. In the Craig-Mayes area the production costs decreased as the production per cow increased except in the first group which, as previously explained, were a summer production group and not strictly comparable with the other herds.

Poultry Production Costs

Poultry production was relatively profitable in Oklahoma in 1931. Eggs were extremely low in price during the spring and summer months, but feed costs were also very low and live poultry was the best paying commodity of any products sold in quantity from Oklahoma farms. In December, 1931, live poultry had a purchasing power of 109 on a pre-war basis of 1910-1914 equaling 100. On the same basis, all crops had a purchasing power of 62, all livestock had an index of 76; and the purchasing power of all Oklahoma farm products was only 65 per cent of the pre-war average.¹

TABLE X.—Cost of Poultry Production, Garfield County, 1931.

Number of flocks	43	
Average number of hens per flock	167	
Average value per hen	\$.58	
Costs per year, per hen:		
Feed—		
Corn and kafir, 2½ lbs. @ ¾¢	\$.02	
Oats, 6 lbs. @ ½¢ .....	.03	
Wheat, 39 lbs. @ ¾¢ .....	.29	
Commercial feed, 4 lbs. @ 1½¢ .....	.06	
Skim milk, 15 lbs. @ ½¢ .....	.03	
Total feed cost per hen		\$.43
Depreciation in flock value .....		.16
Stock purchased .....		.08
Interest and taxes .....		.04
Shelter cost .....		.17
Man labor, 1.69 hours @ 16¢ .....		.27
Miscellaneous costs .....		.16
Total costs per hen		\$1.31
Credits		
Eggs sold, 6 dozen @ 12¢	\$.72	
Poultry sold .....	.42	
Total sales per hen		\$1.14
Eggs eaten, 1 dozen @ 12¢ .....	.12	
Poultry eaten .....	.11	
Total home use .....		.23
Total credits per hen		\$1.37
Net profits per hen .....		.06

The poultry studied on farms in this investigation was kept in small flocks and could not be considered a major enterprise but rather was of the

¹Oklahoma Current Farm Economics, February, 1932, p. 12.

nature of a sideline on most farms. The average size of the flocks in Garfield county was 167 birds. Because much of the feed consumed by poultry is picked up about the farm the amounts of feed fed to the average flock were low. Only 51.5 pounds of concentrates were fed per hen on the average Garfield county farm. Of this total, wheat made up the major portion, 39 pounds. In addition, large amounts of skim milk were fed to poultry on these farms. Records of commercial poultrymen, and experiment station results, indicate that the quantities of feed referred to in this tabulation were approximately two-thirds of the total consumption per hen. Feeds were charged at current market prices during 1931—45 cents a bushel for corn, kafir and wheat. The feed costs amounted to 43 cents per hen or approximately one-third of the total annual cost per hen. (See Table X.) Of the expenses of poultry production aside from feed costs, labor was the largest single item, 1.69 hours per hen annually. Labor was charged at the same rate in poultry production as other enterprises, 16 cents per hour; and the costs per hen for labor amounted to 27 cents. Shelter costs, that is, the interest, depreciation, repairs and replacements on the poultry house, amounted to 17 cents per hen. In these Garfield county flocks the inventory

TABLE XI.—Cost of Poultry Production, Craig-Mayes Area, 1931.

Number of flocks	48	
Average number of hens per flock	163	
Average value per hen	\$.60	
Costs, per year, per hen		
Feed—		
Wheat, 8 lbs. @ $\frac{3}{4}$ ¢	\$.06	
Oats, 6 lbs. @ $\frac{1}{2}$¢ .....	.03	
Corn, 20 lbs. @ $\frac{3}{4}$¢ .....	.15	
Kafir, 8 lbs. @ $\frac{3}{4}$¢ .....	.06	
Commercial feed, 8 lbs. @ $1\frac{1}{2}$¢ .....	.12	
Skim milk, 30 lbs. @ $\frac{1}{2}$¢ .....	.06	
Total feed cost per hen		\$.48
Stock purchased .....		.07
Interest and taxes .....		.04
Shelter cost .....		.13
Man labor, 1.5 hours @ 16¢ .....		.24
Miscellaneous costs .....		.18
Total costs		\$1.14
Credits		
Appreciation in flock value	\$.03	
Eggs sold, 5 dozen @ 13¢ .....	.65	
Poultry sold .....	.44	
Total sales and net increase per hen ..		\$1.12
Eggs eaten, 1 dozen @ 13¢ .....	.13	
Poultry eaten .....	.15	
Total value home use per hen .....		.28
Total credits per hen		\$1.40
Net profit per hen .....		.26

values decreased during the year, amounting to 16 cents per hen on the average. The other items of stock purchased, interest, taxes and miscellaneous costs went to make up a total cost per hen per year of \$1.31.

Production per hen on these farms was estimated at 100 eggs per hen per year. Out of this amount six dozen were sold, one dozen consumed in the home and the remainder used as setting eggs or were wasted. Considerable amounts of poultry were sold, amounting to a credit of 42 cents per hen on the average; and the poultry consumed by the farm family was given a value of 11 cents per hen. The total credits from both eggs and poultry amounted to \$1.37 per hen, leaving a net profit per hen of six cents. No attempt was made on the basis of the records available to compute the cost of producing a dozen eggs nor a pound of poultry. However, it is apparent from the data presented that if the eggs which were sold had brought 11 cents a dozen instead of 12 cents a dozen as was used in the compilation of poultry income, the profit from the poultry enterprise would have been zero. On this basis, the costs of producing eggs on these farms under 1931 conditions were approximately 11 cents per dozen when the profit or loss from meat production was charged to egg production.

In the Craig-Mayes area under similar conditions the amount of feed consumed was approximately the same, 50 pounds of concentrates and 30 pounds of skim milk per hen. The type of ration fed was somewhat different, corn being of the greatest importance in the Craig-Mayes area. Feed costs per hen amounted to 48 cents. The inventory values of the flocks were more than maintained in the Craig-Mayes area, the replacements by young stock more than offsetting the value of the hens that were culled out or sold. Instead of a depreciation in the flock value, there was a small appreciation value. This is shown in the items of credits per hen amounting to three cents per hen. Slightly less man labor was used in Garfield county, 1.5 hours per hen. The total annual costs per hen amounted to \$1.14. Production per hen was slightly less than Garfield county. However, the eggs were sold at 13 cents per dozen, which was higher than in the Garfield county area. The total credits amounted to \$1.40 per hen, leaving a net profit of 26 cents per hen.

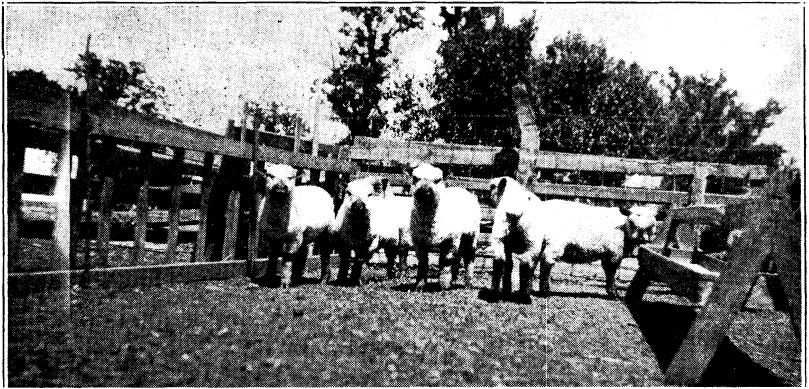
The figures of egg production and distribution on 19 Oklahoma poultry flocks from the complete production records kept among the farm account book cooperators in 1931 are shown in Table XII. The value of the current egg production per hen at the average prices paid to Oklahoma farmers is also shown. In Garfield county where the average production was 100 eggs per hen the value of the eggs produced amounted to \$1.12 per hen per year, while in the Craig-Mayes area on the farms where the average production was 126 eggs per hen the annual value was \$1.42 per hen at the average Oklahoma farm price of eggs. These valuations of production are not actual cash sales because on many farms with small flocks a major portion of the production was consumed at home. However, these figures do show the variations in production per hen in various months of the year and serve to point out the variations in income from egg production at various seasons of the year. In both areas the month of March in 1931 was the month of largest production and largest value of production per hen. The late summer and early fall months are apparently the seasons of low production and low income.

The production costs per dozen eggs are not necessarily the same in all months of the year. Low feed costs or high production per hen may offset the disadvantage of low prices. Likewise, high egg prices do not necessarily mean profitable poultry production where the feed costs, housing and other items of costs are high and egg production is low.

TABLE XII.—Distribution of Egg Production and Value in 19 Oklahoma Poultry Flocks on Which Complete Production Records Were Kept, 1931.

Month	8 GARFIELD COUNTY FLOCKS		11 CRAIG-MAYES AREA FLOCKS		Average egg prices for 1931* (Cents per doz.)
	Eggs laid per hen	Value of production per hen (Cents)	Eggs laid per hen	Value of production per hen (Cents)	
January	9	14	9	14	18.0
February	12	11	14	13	11.0
March	15	13	18	22	14.4
April	13	14	16	18	13.2
May	11	9	14	11	9.6
June	8	7	10	9	10.9
July	7	6	9	7	10.0
August	6	6	8	8	11.8
September	5	5	7	7	12.6
October	5	7	7	9	15.8
November	4	6	7	11	18.8
December	5	9	7	13	21.7
TOTAL	100	\$1.12	126	\$1.42	14.0

*From Oklahoma Crop and Livestock Reports.



Sheep are a profitable sideline on many Oklahoma farms.

PART II

FARM POWER AND EQUIPMENT COSTS ON 114 OKLAHOMA FARMS, 1931

Costs of Tractor Operation

Slightly more than one-half of the farms in this investigation in Garfield county used tractors either alone or in conjunction with horses as a source of power. Most of the tractors were of the 15-30 horsepower size. Only a few of the Craig-Mayes area farms maintained tractors and no tabulation of tractor costs in that area are made.

The records kept in the farm account books were not in all cases complete as to the kinds and quantities of fuel used. In fact, such a variation of fuels—kerosene, gasoline, and distillate was used on the various farms—that no attempt was made to determine the quantities of fuel used. Fuel prices were very low in the summer of 1931. Many farmers purchased gas for a period in the summer for as little as four cents per gallon, while early in the year fuel prices were much higher. In many instances the fuel and oil were lumped together so that no tabulation of the physical quantities of gas and oil was possible from the 1931 records.



Terracing is most profitable on good land.

An attempt is being made on a limited number of farms where the records are being kept in 1932 to obtain the physical quantities of fuel, oil and grease used in tractors under actual farming conditions. Such data would be of more value than those presented here as they could be used with accuracy under changed price conditions at some later date.

The principal cause of variation in the cost of tractor operation between the various farms in 1931 was apparently the difference in days of annual use of the tractor on specific farms. As shown in Table XIII, the average tractor in the 18-32 horsepower group was used at a smaller cost per hour, 69 cents, than the average 15-30 horsepower tractor, 78 cents per hour, due largely to the fact that the average 18-32 horsepower tractor was used 54 days per year while the 15-30 horsepower tractors were used on an average only 42 days per year.

On farms where the tractor was used about the average number of days per year there was approximately an equal division in the total costs of annual use between cash operating expense and the overhead cost of interest, depreciation and miscellaneous expenses. Because these overhead costs tend to remain much the same whether the annual use of the tractor was large or small, the farms using the tractors a large number of days per year had less of the total annual cost in these items. On the farms where the tractor was used but little, interest and depreciation made up a major portion of the annual costs.

The effect of differences of hours in annual use on specific items is shown in Table XIV in a grouping of the 15-30 horsepower tractors according to hours of annual use. It will be noted in this table that the costs per hour of fuel, oil, grease and other cash expenses were practically uniform between the various groups and averaged 41 cents per hour. On

TABLE XIII.—Average Costs of Tractor Operation on 35 Garfield County Farms, 1931.

Horsepower groups	10-20	15-30	18-32
Number of tractors	6	23	6
Average value per tractor	\$370.00	\$684.00	\$748.00
Average days of use per year	34	42	54
Costs per year per tractor			
Cash expense—repairs, fuel, oil, grease, and license	\$ 91.17	\$169.78	\$196.43
Interest @ 5%	18.50	34.20	37.50
Depreciation	79.17	92.40	107.43
Labor and miscellaneous	18.60	31.25	32.30
Total cost	\$207.44	\$327.63	\$372.56
Costs per hour per tractor	\$.61	\$.78	\$.69

TABLE XIV.—Variations in the Costs of Operating 15-30 and 15-27 Horsepower Tractors According to Hours of Annual Use on 23 Garfield County Farms, 1931.

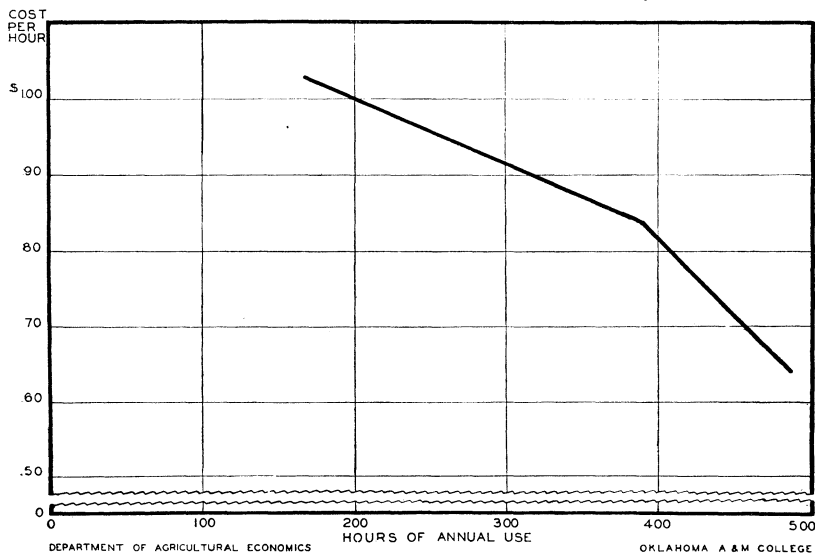
Hours of annual use, range	Less than than 300	300 to 400	More than 400	Average
Average hours of annual use	266	387	488	420
Number of tractors	7	8	8	23
Average value per tractor	\$722.43	\$617.25	\$717.25	\$684.00
Average annual cost per tractor	274.29	324.38	373.00	327.63
Cost per hour of use				
Cash costs—grease, fuel, oil, license and repairs .....	.43	.42	.39	.41
Depreciation .....	.37	.27	.13	.22
Interest .....	.14	.08	.06	.08
Miscellaneous and labor .....	.09	.07	.06	.07
Total cost per hour	\$1.03	\$.84	\$.64	\$.78

the other hand, interest and depreciation per hour of use declined steadily as the hours of annual use increased. The tractors that were used an average of less than 30 days per year had a cost of \$1.03 per hour while those used more than 40 days averaged 488 hours of annual use and had a cost of only 64 cents per hour. These figures do not include the wages of the operator who drove the tractor.

The above discussion illustrates one of the most important problems that farmers have to meet in the successful management of their farms, namely, the fitting of the power and equipment available to the size of their farms. A large and expensive machine such as a tractor that is used only a small portion of the time or at much less than its capacity is very expensive to operate and adds greatly to the cost of the farm products produced with it. The advantage and economy of modern labor-saving machinery such as the tractor and combine can be dissipated and in fact turned into a source of loss when the machines are not used to capacity. The same line of reasoning applies to the efficient use of horse labor and man labor. On farms where the family labor is not used fully or where too many horses are kept to do the work available, the returns from farm-

ing must necessarily be small. One of the most important leaks found on many farms was traced, in this investigation, to high costs of power because too much power, either in the form of horses or tractors or both, was maintained for the work available. It was not unusual to find a difference of 50 per cent in the cost of tractor work or horse labor between neighboring farms because of a difference in the hours of annual use of these instruments of production.

Hours of Annual Use as a Factor Affecting Average Cost per Hour of 15-30 Horsepower Tractors, 23 Tractors, Garfield County, 1931



In determining the amount of power necessary, farmers must choose between the number of horses or tractor horsepower that would be convenient to have available at the height of the rush season and the minimum that can accomplish the work to be done by careful planning of the farming operations. It is true that some excess of farm power in the shape of tractors or horses is advisable in order to get the work done on time, but apparently too many farmers are extravagant in this item of excess power; effort expended in planning the farming operations in as systematic a manner as possible and efforts spent in adjustment of the power resources to the requirements of a particular farm organization are very profitable. Decreasing power costs in this manner is one way in which farmers can lower their cost of production.

Costs of Horse Labor on 100 Oklahoma Farms, 1931

Slightly more than one-half the total costs of maintaining a horse in 1931 in both the Craig-Mayes and Garfield County areas was feed costs. (Table XV.) Total feed costs were slightly lower in the Garfield county area than in the Craig-Mayes area because little grain was fed and more pasture was used. This is exactly opposite to the practices followed in these two areas as to the relative proportion of pasture used and grain fed to dairy cows. Horsemen and practical farmers have in recent years been calling attention to this means of economizing in the costs of horse labor. Pasture not only is a cheaper source of feed, but tends to reduce the hours

of man labor in caring for the horses. Also, approximately one-half of the hay fed in Garfield county was legume hay, mostly alfalfa, another factor tending to lower the maintenance costs of horses. Grain and hay were charged at the current market prices prevailing locally in 1931.

TABLE XV.—Cost of Horse Labor on 110 Oklahoma Farms, 1931.

Items	Garfield County	Craig-Mayes Areas	
Average number of horses per farm	5	6	
Average value of horses per head	\$43.36	\$47.60	
Average hours of labor per horse annually	630	660	
Costs per horse			
Feed		Costs per horse	
Oats, 39 bu. @ 25¢	\$9.75	Oats, 50½ bu. @ 25¢	\$12.62
Other grain, 2 bu. @ 40¢	.80	Corn, 13 bu. @ 40¢	5.20
½ ton legume hay @ \$10.00	5.00	Hay, 2 tons @ \$5	10.00
½ ton non-legume hay @ \$6.00	3.00	Pasture	3.00
Pasture	8.60		
Total feed - - - -	\$27.15		\$30.82
Depreciation, including purchases less sales	4.52		3.86
Interest on investment @ 5%	2.17		2.38
Taxes	.44		.60
Man labor @ 16¢ per hour	6.72		7.04
Shelter (barn cost)	5.97		4.80
Harness costs	1.90		1.51
Other miscellaneous costs	1.53		1.78
Total cost per horse -	\$50.40		\$52.80
Average cost per hour of horse work	\$.08		\$.08

TABLE XVI.—Cost of Maintaining Harness per Horse on 107 Oklahoma Farms, 1931.

Items	Garfield county	Craig-Mayes area
Value of harness per horse	\$7.20	\$5.83
Costs per horse:		
Repairs and new harness	.43	.18
Depreciation	.87	.74
Interest @ 5 per cent	.36	.29
Taxes	.07	.07
Miscellaneous, including labor	.17	.23
Total cost per horse - - - -	\$1.90	\$1.51

The average value of horses per head as shown in Table XV are low compared with prices prevailing a few years ago and yet higher than the average of the State as a whole. The Oklahoma crop report gives the aver-

age value of horses on Oklahoma farms in 1931 as \$33.50 per horse. Depreciation costs were small on these low valued horses, and many of the farmers were keeping some horses that actually increased in value rather than depreciated. Harness costs as shown in Table XVI were extremely low, due primarily to the low valuation placed upon harness and the fact that little or no new harness was purchased.

The average cost in both Garfield county and in the Craig-Mayes area was eight cents per hour of horse labor or slightly over \$50 annually per horse. The cost of keeping a horse in the Craig-Mayes area was slightly higher than in Garfield county, but the larger number of hours of work per farm per horse in the northeastern area offset the difference in annual costs. Much larger differences in the hours of annual use were found between farms. The hours of annual use in both areas was relatively low. On farms where the number of horses was not excessive compared with the work to be done and where economical feeding practices were followed, costs materially lower than these averages prevailed.

In times of economic stress, horses have an advantage over tractors as a source of power in that a much smaller percentage of the maintenance costs are cash costs. As may be noted in Table XV, a major portion of the total costs of maintaining a horse is feed which is largely grown on the farm and man labor used in caring for the horses. On the other hand, from the standpoint of economy in cost per unit of power, tractors are generally more economical. The principal advantage of a tractor lies largely in its greater economy in the use of man labor rather than in the cost of power itself. For example, the cost of power per acre with a tractor in plowing may be as much as the horse labor cost, but where three times as much land is plowed in a given length of time with the tractor as with horse equipment, the man labor cost would be only one-third as much. Economy of tractor operation, therefore, stands out greatest when large tractor equipment is compared with small horse equipment. At the present time, when farm labor is cheap, the greater economy of tractor operation is not so apparent if present at all. When improvement in farm economic conditions permits the earning of anything like satisfactory wages, the economy of the tractor and other labor saving equipment will be again an important factor in determining farm profits.

The problem of choosing the most economical source of farm power is not a simple one. Horses have been low in price relative to their cost of production and to other livestock prices for the past 10 years. Tractors and other machinery costs have remained relatively high while the price of farm products has been declining. The lower investment in horses as against tractors as a source of farm power has been a factor favoring horses. In recent years the prices of horse feed have been low as compared with tractor fuel and oil prices. The past or present relationships between the costs of these various sources of power may or may not prevail in the future. However, as previously pointed out, mere cost of power is not the only consideration in choosing which type of power will be used. Large teams of from 12 to 24 horses have been used by a few farmers. However, the cumbersome and inconvenience in using teams of these numbers have prevented their widespread use. A horse outfit plows on the average of one acre per day per horse in the team. Thus a 12-horse team would plow only as much as a moderate size tractor in a 10-hour day. If necessary the tractor can be run 24 hours a day during rush periods. Timeliness is a factor affecting farm profits in many farm operations. Hence the choice of power depends not only upon the relative prices of horses and tractors, fuel and feed, but also upon the effect the use of the various sources of power has upon the net farm income. The use of tractors in the wheat growing sections of Oklahoma has increased four-fold in the past 10 years. **Much more than half the wheat grown in Oklahoma is now produced with**

tractor power. No forecast is attempted in the present publication of the future trend in the use or relative costs of power with either horses or tractors. However, it is worthwhile to point out some of the factors affecting the relative advantages aside from mere costs of the two sources of farm power.

Costs of Maintaining an Automobile or Truck

An average of slightly more than one automobile or truck was maintained on 35 farms in the Craig-Mayes area and nearly two automobiles or an automobile and a truck were maintained on the average Garfield county farm. The average annual maintenance of the automobiles or trucks kept on these farms was \$191.87 in the Craig-Mayes area and \$231.02 per automobile in Garfield county. (Table XVII.) Cash costs for repairs, gasoline, oil, tires and license made up approximately one-half of the annual cost of maintaining an automobile or truck on these farms in 1931.

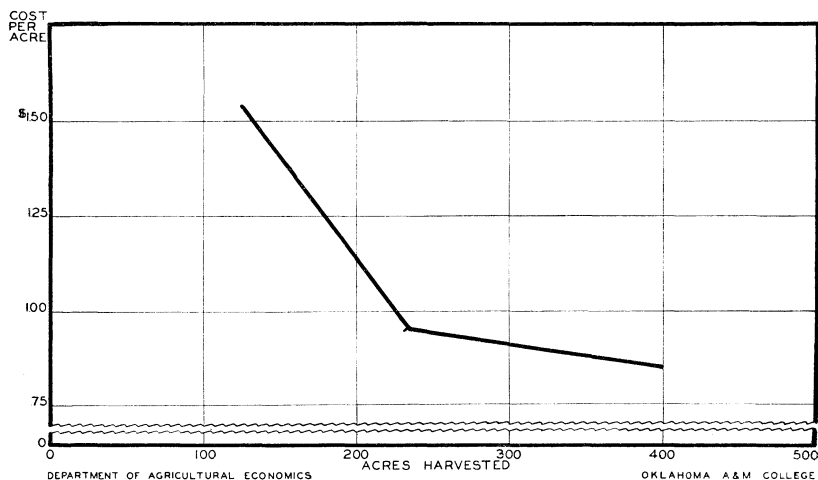
**TABLE XVII.—Cost of Maintaining an Automobile or Truck,
93 Oklahoma Farms, 1931.**

Items	Garfield county	Craig-Mayes area
Number of farms	58	35
Number of automobiles and trucks	90	38
Average value of automobile or truck	\$231.02	\$191.87
Costs per auto or truck		
Repairs, license, tires, oil, and gasoline	90.67	70.18
Depreciation	68.16	37.05
Interest @ 5%	11.55	9.59
Shelter and miscellaneous costs	25.53	17.42
Cost per automobile or truck - - - -	\$195.91	\$134.24
Estimated miles of annual use		
Per automobile	5987	
Automobile per farm	6532	
Automobile, farm business only	3525	
Per truck	2370	

TABLE XVIII.—Cost of Maintaining a Combine, Garfield County, 1931.

Items	Per 12-foot combine	Per 16-foot combine
Number of combines	9	9
Average acres combined per farm	199	227
Average value of combine	\$637.22	\$823.67
Costs:		
Repairs, fuel, oil and grease	38.04	44.22
Depreciation	103.33	145.00
Interest @ 5%	31.86	41.22
Taxes	6.50	8.40
Miscellaneous costs	15.58	22.30
Total cost per combine	\$195.31	\$261.14
Total cost per acre	.98	1.15
Average cost per acre all sizes		\$1.07

Acres Harvested as a Factor Affecting Average Cost per Acre of Combine Use, 18 Combines, Garfield County, 1931



Combine Costs

The average annual cost of maintaining a 12-foot combine in Garfield county was \$195.31 and for the average 16-foot machine it was \$261.14. for the 12- and 16-foot machines. The greater cost per acre for the 16-foot (Table XVIII.) The costs per acre were \$.98 and \$1.15 per acre respectively machines was largely due to the fact that the acreage cut was proportionately smaller than that harvested by the smaller machines.

Depreciation was the largest item of expense, more than 50 per cent of the total annual cost, with both sizes of machines. The computation of costs on individual farms leads to the suggestion that, unless a combine can be used to something like capacity, perhaps 10 days or more per year, hiring a combine, owning one in partnership with a neighbor or other means of harvesting would, as a rule, be more economical. Table XIX indicates costs

TABLE XIX.—Variations in the Cost of Operation of Combines According to Acres Harvested, 18 Garfield County Farms, 1931.

Acres harvested per combine, range	300-500	200-299	90-199
Number of combines	3	7	8
Acres harvested per combine, average.....	400	234	124
Average value of combine.....	\$975	\$640	\$718
Costs per acre			
Repairs and fuel	\$.17	\$.19	\$.18
Depreciation .....	.46	.50	.87
Interest @ 5% .....	.12	.14	.29
Taxes .....	.02	.03	.06
Labor and miscellaneous .....	.08	.09	.14
Total cost per acre*	\$.85	\$.95	\$ 1.54

*These cost figures do not include the costs of the tractor in pulling the combine or the wages of the combine operator.

per acre of combine operation on farms where the acreage of grain harvested was variable. Where less than 200 acres of grain was cut per machine the costs per acre of combine operation were very high, averaging \$1.54 per acre.

Machinery Costs

Machinery costs amount to a considerable figure on most farms at the present time. The average value of machinery and farm equipment, exclusive of automobile, tractor, truck and combine, on the Garfield county farms amounted to \$625.66 per farm and in the Craig-Mayes area approximately one-third less or \$429.35 on the average. (Table XX.) Due to the larger acreage of crops per farm the value of machinery per acre of crops was slightly smaller in Garfield county than in the northeastern area, \$2.52 per acre of crops as compared with \$2.92.

The cost of machinery in interest, depreciation, taxes, repairs, oil, grease, shelter and miscellaneous expenses amounted in Garfield county to \$178.84, or 72 cents for each acre in crops. (Table XX.) In the Craig-Mayes area the total costs of machinery per farm amounted to \$128.07 on the average, or 87 cents per acre in crops. Because many of the costs are not immediate cash outlays, many farmers do not realize the amount and extent of machinery costs. The figures presented in Table XX indicate that the annual cost of the average farm machine amounted to nearly 30 per cent of its present value or approximately 15 per cent of its first cost as a new machine.

TABLE XX.—Cost of Maintaining General Field Machinery and Equipment Exclusive of Auto, Tractor, Truck and Combine, 102 Oklahoma Farms, 1931.

Items	Garfield county	Craig-Mayes area
Number of farms	59	43
Value of machinery per farm	\$625.66	\$429.35
Acres in crops per farm	248	147
Value of machinery per acre in crops	\$2.52	\$2.92
Cost per farm		
Repairs, oil and grease	\$39.32	\$40.63
Depreciation	72.07	43.77
Interest @ 5%	31.28	21.47
Taxes	6.37	5.49
Miscellaneous costs including shelter and repair and labor	29.80	16.71
Total annual cost per farm	\$178.84	\$128.07
Per cent of total value	28.6	29.9
Cost per acre in crops	\$.72	\$.87

Annual Building Costs

Figures on the annual building costs (all buildings exclusive of residence) on 57 Garfield county farms of varying size are presented in Table XXI. It was found that the value of buildings per farm exclusive of the residence tended to increase somewhat with the size of farm though not proportionately. Therefore the annual costs of buildings per acre were lowest on the large farms. On the farms of less than 320 acres the average annual cost was \$256.79 or \$1.17 per acre. On the farms between 320 and 400 acres in size the annual costs were \$322.71 or \$.97 per acre; and on the farms of 400 acres and over the annual cost averaged \$428.98 or \$.77 per acre. From these figures it can be readily seen that

building costs are an important item of farm expense, averaging close to \$1 per acre. Many of the items of expense shown in Table XXI are low. For example, many of the farms did not carry insurance and hence the figures shown for insurance costs are lower than where complete coverage was carried. Also these figures do not include the costs of the residence. On many farms, especially in Garfield county, the residence represents a considerable investment and as this investment does not contribute directly to the farm income it was left out of the above tabulations.

TABLE XXI.—Annual Cost of Farm Buildings Exclusive of Residence on 57 Garfield County Farms, 1931.

Size of farm, acres	Less than 320	320 to 400	More than 400	Average
Number of farms	24	16	17	57
Average acres per farm	220	335	559	353
Value of buildings exclusive of residence per farm	\$1794.00	\$2742.00	\$3231.00	\$2488.00
Costs per farm				
Insurance	2.50	1.71	4.65	2.86
Depreciation	57.25	87.63	85.94	76.08
Repairs and new buildings	47.29	27.38	74.53	49.82
Interest @ 5%	89.70	137.10	161.50	124.40
Taxes	18.37	27.94	32.76	25.35
Labor and miscellaneous	41.58	41.11	69.57	49.79
Total annual cost per farm	\$256.79	\$322.71	\$428.98	\$326.59
Per cent of total value	14.3	11.8	13.3	13.1
Average cost per acre	\$ 1.17	\$.97	\$.77	\$.92

TABLE XXII.—Cost of Maintaining Farm Buildings, Exclusive of the Farm Residence, on 42 Craig-Mayes Area Farms, 1931, According to Size of Farm.

Items	Small farms	Medium-sized farms	Large farms	Average of all farms
Number of farms	13	15	14	42
Average size of farm, acres	116	212	427	254
Average value of building per farm	\$825.69	\$1013.70	\$1514.57	\$1136.76
Average value of building per acre	\$7.12	\$4.78	\$3.55	\$4.48
Costs per farm				
Repair and new buildings	\$20.77	\$20.33	\$41.57	\$27.55
Depreciation	50.77	56.67	33.28	47.08
Insurance*	1.69	2.13	1.86	1.90
Interest @ 5%	41.28	50.68	25.73	56.22
Taxes	10.46	12.87	19.43	14.39
Man labor and miscellaneous	18.64	20.30	30.93	23.43
Total cost per farm	\$143.61	\$162.98	\$202.80	\$170.57
Total cost per acre	\$1.24	\$.77	\$.48	\$.67

*Insurance was not carried by all farmers.

Annual building costs in the Craig-Mayes area were considerably lower on the average than in Garfield county, due largely to the smaller investment in buildings per farm. (Table XXII.) However, because of the smaller size of the farms in the northeastern area the costs per acre there were only slightly less, \$.67 per acre on the average farm as compared with \$.92 in the Garfield county area. As in the Garfield county area, there was an increase in the total value of the buildings per farm, but a decrease in the value of buildings per acre and a decrease in building cost per acre as the size of the farm increased.

Adequate buildings are necessary for storage of crops and economical maintenance of livestock. However, when the investment in buildings becomes excessive or the buildings are in excess of the needs of the farm, they are a considerable source of expense and oftentimes are a contributing factor to serious losses. On small farms in particular the buildings are in many cases inadequate for the needs of the farm and yet represent a large investment and have a high maintenance cost per acre of crops or unit of livestock products produced.

TABLE XXIII.—Standard Rates of Operation on 114 Oklahoma Farms, 1931.

Operation	Size of machine	POWER		Acres per 10-hour day	Man hours per acre
		Number horses	Tractor horsepower		
Plowing	12"	2	-----	2.2	4.5
	24"	4	-----	4.0-4.5	2.5-2.2
	28"	-	10-20	8.5	1.2
	42"	-	15-30	12.5-14.0	.8- .7
Springtooth	7'	5	-----	14.0	.7
	12'	-	15-30	33.0	.3
Disking (tandem)	7'	4	-----	14.0	.7
	8'	-	10-20	20.0	.5
	8'	-	15-30	25.0	.4
Harrowing	15'	4	-----	33.0	.3
	20'	-	10-20	50.0	.2
	30'	-	15-30	70.0	.15
Drilling	8'	4	-----	17.0	.6
	10'	-	10-20	25.0	.4
	16'	-	15-30	33.0	.3
Planting	2 row (76")	2	-----	14.0	.7
	2 row (84")	2	-----	17.0	.6
Listing	1 row	4	-----	8.0	1.3
Cultivating	1 row (38")	2	-----	8.0	1.3
	2 row (84")	4	-----	17.0	.6
Mowing	5'	2	-----	10.0	1.0
Raking	10'	2	-----	20.0	.5
Binding	7'	4	-----	14.0	.7
Combining	16'	-	15-30	33.0	.3

PART III

**CROP PRODUCTION COSTS IN NORTHEASTERN AND
NORTH CENTRAL OKLAHOMA, 1931****Standard Rates of Operation**

The rate at which work is performed is important in determining the labor requirements of crop production. Rates of operation are determined largely by the size of machine and the kind and amount of power used. The topography, physical conditions of the soil, size and shape of fields and climatic conditions also exert some influence on the rate of operation. The average rates of operation for various kinds of work were determined on 114 farms in this investigation. These are shown as the standard rates of operation in Table XXIII.

The most common rate of operation of horse-drawn implements is two acres per day per foot of width of machine. With tractor-drawn machines the rate of operation varies from two to four acres per day per foot of width of machine. In plowing, where the traction is usually good and the tractor is generally used to its full capacity, a rate of four acres per day per foot of width of the plow is often attained.

The average rate of speed when the rate of operation is two acres per day per foot of width of machine is 1.65 miles per hour. This figure is apparently the average speed of a horse at heavy draft work when the usual allowance is made for time lost in turning and in rest periods. Variations from this average speed occur from farm to farm and in various operations depending on the size and condition of the horse, the draft of the machine, the length of the field and soil and climatic conditions. Average speed for the various operations on all farms was remarkably uniform and close to this figure of 1.65 miles per hour for all horse work. This rate can be exceeded considerably for short periods with better than average work stock.

Use of Cost-of-Production Data

The following tables of typical operations and crop production costs show the farm practices, quantities of labor, power and materials for the various crop enterprises as found on farms in the Garfield and Craig-Mayes area in 1931. Wide variations from the averages or typical operations presented here occurred on individual farms due to differences in the size of equipment used and the particular production practices followed. These data are valuable as a standard of comparison and in determining the usual requirements for various enterprises. The cost figures presented herewith should be taken as relative rather than absolute. Many of the costs shown are not out-of-pocket cash expenses. Many of the costs are arbitrary evaluations such as the value of the operator's labor, depreciation of equipment, credits for crop residues and a number of similar items. Costs on individual farms were therefore both higher and lower than the average shown here. As far as possible the actual expenses, both cash and non-cash, as they existed on these farms in 1931 are shown.

If these cost-of-production data are used in determining costs on a particular farm or at some later period, the items of cost should be charged at the rate or price then prevailing on that particular farm. In other words, the information presented here is of use as a standard of comparison, and the interpretation of results on specific farms or at later periods must be made in the light of prices, production practices and yield existing in each specific instance. Variations of 50 per cent from the normal or average cost of production are not unusual in the records of any considerable number of farms.

Wheat Production Costs

The typical operations in producing wheat in Garfield county in 1931 with tractor power and with horses are shown in Table XXIV. Considerable variations were present in the methods of seed bed preparation followed

TABLE XXIV.—Typical Operations on Wheat Farms in Garfield County, 1931.

Operation	Date	Size of machine	NUMBER OF		Times over	HOURS PER ACRE		
			Men	Horses		Men	Horses	Tractor
On Farms Using Horses								
Plowing	July	24"	1	4	1	2.5	10.0	..
Harrowing	Sept.	15'	1	5	2	.3	4.0	..
Drilling	Oct.	8'	1	4	1	.6	2.4	..
Cutting	June	7'	1	4	1	.7	2.8	..
Shocking	June		1		1	.8	..	..
Threshing	July		10	14	1	2.0	2.8	..
Total						7.4	22.0	
On Farms Using Tractors								
Plowing	July	42"	1	..	1	.8	..	.8
Harrowing	Sept.	30'	1	..	2	.3	..	.3
Disking (tandem)	Sept.	8'	1	..	1	.4	..	.4
Drilling	Oct.	16'	1	..	1	.3	..	.3
Combine	June	16'	2	..	1	.6	..	.3
Trucking	June	..	..	..	..	.6	..	..
Total						3.0		2.1

on the various farms. Many of the farms used a one-way in place of a mold-board plow. Some farmers listed the land one or more times. The labor and power requirements, however, for the different methods of seed bed preparation were not materially different on the various farms where similar power was used.

On the farms using horses the wheat was usually cut with a binder and threshed from the shock, while on the tractor farms the more common practice was to harvest with a combine, though here again some variation from farm to farm appeared among the various farmers. Not all of the tractors were of the 15-30 horsepower size though this size was by far the most common and the typical operations are shown as of this group of tractors.

It was noticeable that, as a rule, the seed bed was given more timely preparation and more operations were performed, for example an extra disking, on the tractor-operated farms than on the average horse-operated farm. The total man hours spent per acre on the tractor farms amounted to three hours per acre, while the farmers using horses spent an average of 7.4 man hours per acre in wheat production. However, a large proportion of this variation in these requirements is due to the difference in the labor requirements of the respective methods of harvesting most commonly followed. The power requirements were respectively 2.1 tractor hours and 22 horse hours per acre of wheat.

The costs of growing wheat on 59 Garfield county farms by various power methods are shown in Table XXV. The 11 farms operated entirely



Garfield county farmers are interested in wheat.

with horses are not strictly comparable with the farms in the other groups. It should be noted that the land on the horse-operated farms was valued at only \$45 per acre in comparison with \$60 and \$65 per acre in the other groups, indicating that the land was less productive. The farms using only horses tended to be the smaller farms in the poorer areas. The yields were decidedly lower, averaging 16.2 bushels per acre or approximately 20 per cent below the average yields obtained in the other groups. Also, binding and threshing, which are generally the methods of harvesting on the horse-operated farms, are more expensive than combining.

Nearly one-half of the farms, 27 out of the 59, used both horses and tractors as sources of power. The average yield of wheat per acre was the highest in this group, but only in proportion to the larger valuation placed upon the land. The lowest total costs per acre were obtained in the tractor-operated group, \$10.50 per acre. The tractor-operated farms, however, averaged 229 acres of wheat per farm. This relatively large size gave this group an advantage in the efficiency of the use of equipment.

General farm expense was a considerable item on these wheat farms, amounting on the average to \$2.11 per acre. This item, on a per acre basis, was considerably higher on the smaller horse-operated wheat farms than on the larger tractor-operated farms. General farm expense includes all of the miscellaneous overhead costs chargeable to the wheat enterprise. It includes a proportionate share of the use of the automobile for business purposes; also a share of the farm telephone expense, the value of the farmer's time in the general supervision of the wheat enterprise, and other similar miscellaneous items of general farm overhead and expense. This item of general farm overhead is often omitted in making rough estimates of the cost of production of various crops, but it is a legitimate item of expense and one that the farm business as a whole must bear.

Pasture was credited to the wheat enterprise at 85 cents per acre on the average farm. It was found that as a rule the small horse-operated farms made slightly more use of pasture than the larger tractor-operated farms, and therefore some variation in the pasture credit was made between the various groups of farms. No credit was allowed for the wheat straw, though on some farms considerable use was made of this by-product of wheat production. In computing the value of wheat produced, a uniform price of 35 cents per bushel was used. The actual prices obtained by various farmers ranged widely from this figure, varying from 25 to 50 cents per bushel, but averaged 35 cents per bushel for the 1931 crop.

Under the conditions prevailing in 1931, the costs per bushel averaged approximately 50 cents, varying from 47 cents per bushel on the tractor-operated farms to an average of 62 cents per bushel on the horse-operated

TABLE XXV.—Wheat Production Costs, Garfield County, 1931.

Kind of power	HORSE-OPERATED FARMS			TRACTOR-OPERATED FARMS			HORSE- AND TRACTOR-OPERATED FARMS		
	Quantity per acre	Price per unit	Cost per acre	Quantity per acre	Price per unit	Cost per acre	Quantity per acre	Price per unit	Cost per acre
Number of farms		11			21			27	
Acres of wheat per farm		94			229			162	
Yield of wheat per acre, bushels		16.2			20.6			21.1	
Costs per acre									
Man labor	7.4 hrs.	\$.16	\$1.18	3.0 hrs	\$.16	\$.48	4.9 hrs.	\$.16	\$.78
Horse labor	22.0 hrs.	.08	1.76				6.4 hrs.	.08	.51
Tractor				2.1 hrs	.70	1.47	1.6 hrs.	.80	1.28
Seed	1.0 bu.	.62	.62	1.0 bu.	.62	.62	1.0 bu.	.62	.62
Machinery .....			.57			.78			.70
Twine	1.8 lbs.	.11	.20						
Threshing	16.2 bu.	.08	1.30						
Combining						1.15			1.25
Trucking .....						.43			
Taxes .....			.58			.75			.78
Land charge	\$45	5%	2.25	\$60	5%	3.00	\$65	5%	3.25
General farm expenses			2.60			1.84			2.06
Total cost per acre			\$11.06			\$10.50			\$11.23
Credits									
Pasture			\$1.00			\$.80			\$.85
Wheat	16.2 bu.	.35	5.67	20.6 bu.	.35	7.21	21.1 bu.	.35	7.38
Total credits per acre			\$6.67			\$8.01			\$8.23
Net cost per bushel		\$.62			\$.47			\$.49	
Net profit per acre			-\$4.39			-\$2.49			-\$3.00

farms. The average loss per acre was \$2.98. In using the above figures in subsequent years it should be borne in mind that 1931 was a year of abnormally high yields in wheat. Figures gathered by the federal crop reporting service indicate that yields in this area were approximately 25 per cent above normal in 1931. Furthermore, the farms on which these figures were collected had yields approximately one-fourth higher than the average of all farms in the area. As a rule the farmers who cooperated by keeping an account book and supplying cost-of-production information were the more progressive farmers in the area; and as indicated by the larger yields obtained, they were distinctly above the average in their ability as efficient producers of farm products. The greater than average yield, due both to the favorable season and the superior ability of our cooperators, had the effect of making costs per bushel less than that prevailing on the average farm in the area in 1931 or in an average year on these specific farms. For example, a decrease of 25 per cent from the average yield obtained on the farms studied in 1931, a yield of 15.1 bushels instead of 20.4 due to natural causes alone such as deficiency of moisture or insect injury, would have had the effect of raising the average costs from 50 cents, as was actually found in 1931, to approximately 64 cents per bushel. That is, with the lower yield the costs would have been the same except for harvesting and even that would not have been materially different, particularly where the grain was combined. If this reduction in harvesting cost amounted to 40 cents per acre, the average cost per acre would have been \$10.57 instead of \$10.97 and if a wheat pasture credit were allowed at 85 cents per acre, the net cost per bushel in this case would then be \$10.57 less 85 cents pasture credit divided by the yield of 15.1 bushels or 64.3 cents per bushel. In other words, a decrease in yield amounting to 25 per cent would be accompanied by an increase in cost per bushel of 28.6 per cent, a more than proportionate amount.

Effect of Wheat Prices Upon Returns per Farm and per Hour of Labor and Land Values

Should wheat and other farm products remain close to the 1931 level of prices, a still further lowering of land values must result. Maintenance of the relative price relationships between wheat and other farm products prevailing in 1931 would also inevitably result in a decrease in the percentage of crop land in wheat in this area and an increase in the acreage devoted to feed crops that could better be marketed through the more profitable livestock. Looking backward, it is easy to see why this area, and in fact much of western Oklahoma, plunged so heavily into wheat production a few years ago. With a wheat price of \$1.05 per bushel, which was the five-year average farm price in this area between 1924 and 1928, and with production costs and yields as on the tractor-operated farms shown in Table XXV, the net profit on the 229 acres of wheat would be \$2731.97 per farm from the wheat enterprise alone. With a price of 35 cents per bushel, the average loss in wheat production was \$570.21 per farm in this lowest cost group of tractor-operated wheat farms. On the basis of returns per hour of labor expended in wheat production, the loss in 1931 amounted to 67 cents per hour, while with \$1.05 wheat, costs and yields remaining the same, the return per hour of labor would have been a gain of \$4.14 per hour of labor.

Should wheat prices go back, in the next few years, to 70 cents per bushel, a point midway between the 1931 price of 35 cents and the 1924 to 1928 average price of \$1.05 per bushel, the returns from wheat production would be quite satisfactory based on present costs. An average yield of 15 bushels per acre selling at 70 cents per bushel would just pay the actual expenses as shown in Table XXV of \$10.50 per acre. The pasture credit of 85 cents per acre in that case would be a net profit. If wheat prices do not

go back to something like this figure of 70 cents, which is well below the pre-war 1910-14 average Oklahoma wheat price of 86 cents per bushel, the decline in land values and farm wages must continue. Once the adjustment of wages, land prices and other production costs are completed, farmers can produce wheat profitably at 50 cents a bushel or \$1.50 a bushel.

The adjustment to a lower level of prices is, however, extremely difficult to make because wages, taxes, machinery costs and freight rates are always slower than the prices of farm products to change either upward or downward. Thus a major factor in the very profitable wheat production during the World War was the lag in production costs. Likewise, at the present time the lag in adjustment or relatively high cost of production items beyond the farmer's control is an important factor in causing the losses in wheat production. The experience of the past 20 years of violently fluctuating wheat prices cannot be repeated without tremendous financial loss to wheat farmers. A radical shift to a permanently lower level of wheat prices means the confiscation of property values on wheat farms. From the long-time point of view, relatively stable farm prices are more to be desired than extremely high prices of farm products; the prices of farm products may be so high relatively that of themselves they stimulate overproduction and thus bring about their own destruction.

A change in the general level of prices due to manipulation of money and credit facilities may be a more important factor than changes in the supply and demand of a particular commodity in determining the profits and welfare of the producers of that commodity. Farmers have borne the brunt of a burden due to mistakes in the operation of the financial policy of this country since the outset of the World War. A stable money and financial system must precede the establishment of a stable level of farm prices and a permanently prosperous agriculture.

**TABLE XXVI.—Typical Operations in Producing Oats
in Garfield County, 1931.**

Operation	Date	Size of mach.	NUMBER OF			HOURS PER ACRE		
			Men	Horses	Times over	Men	Horses	Tractor
On Farms Using Horses								
Plowing	Dec.	24"	1	4	1	2.2	8.8	..
Harrowing	Feb.	15'	1	5	2	.6	3.0	..
Drilling	Feb.	8'	1	4	1	.6	2.4	..
Binding	June	7'	1	4	1	.7	2.8	..
Shocking	June		1			.8		..
Threshing*	July		11	16	1	2.8	4.0	..
TOTAL - -						7.7	23.0	
On Farms Using a Combination of Horse and Tractor Power								
Plowing	Nov.	42"	1	--	1	.8	--	.8
Spring-toothing	Jan.	8'	1	--	1	.4	--	.4
Harrowing	Jan.	12'	1	4	2	.8	3.2	..
Drilling	Feb.	8'	1	4	1	.6	2.4	..
Binding	June	8'	2	--	1	1.0	--	.5
Shocking	July		1		1	.8	--	..
Threshing	July		11	16	1	2.8	4.0	..
TOTAL - -						7.2	9.6	1.7

*The average crew in threshing consisted of 6 bundle teams, 3 pitchers and 2 grain teams.

Oat Production Costs

The most common practice of seed bed preparation for oats in Garfield county was fall plowing followed by harrowing twice and, on the tractor-operated farms, spring-tooth harrowing once. Again, as was the case with wheat on most farms, the farmers using tractors apparently put in an extra operation in seed bed preparation for oats. Oats were almost always cut with a binder and threshed, rather than combined, because of the value of the straw for feeding purposes. The total labor requirements were not particularly different where the various kinds of power were used, 7.7 hours of man labor per acre being normally used on the horse-operated farms and 7.2 man hours on the tractor operated farms. (Table XXVI.) However, as mentioned above, the farms using tractors generally put in an extra operation in the seed bed preparation, such as harrowing with a spring-tooth harrow. Apparently this addition of labor was profitable, as slightly higher yields were obtained on the farms where larger amounts of labor were expended in seed bed preparation. This difference in yield as actually found on these different groups of farms, however, is not conclusive proof of the superiority of the method of seed bed preparation. Individual variations between farms due to other causes might have been largely responsible for the difference in yield shown. For example, it was found that the horse-operated farms as a rule seeded slightly smaller amounts of oats per acre, 1.8 bushels as compared with two bushels on the tractor-operated farms.

TABLE XXVII.—Cost of Oats Production, 44 Garfield County Farms, 1931.

Kind of power	HORSES			HORSES AND TRACTORS		
	Quantity per acre	Cost per unit	Cost per acre	Quantity per acre	Cost per unit	Cost per acre
Number of farms		13			31	
Acres of oats per farm		25			31	
Yield per acre, bushels		40			47	
Average	Quantity per acre	Cost per unit	Cost per acre	Quantity per acre	Cost per unit	Cost per acre
Costs						
Man labor	7.7 hrs.	\$.16	\$1.23	7.2 hrs.	\$.16	\$1.15
Horse labor	21.0 hrs.	.08	1.68	9.6 hrs.	.08	.77
Tractor				1.7 hrs.	.78	1.33
Machinery			.66			.71
Seed	1.8 bu.	.36	.65	2.0 bu.	.36	.72
Twine	2.2 lbs.	.11	.24	2.5 lbs.	.11	.28
Threshing	40.0 bu.	.04	1.60	47.0 bu.	.04	1.88
Gen. farm exp.			1.06			1.02
Taxes on land			.72			.72
Land charge	\$65.00	5%	3.25	\$65.00	5%	3.25
Total cost per acre			\$11.09			\$11.83
Credits						
Oats	40 bu.	\$.18	\$7.20	47 bu.	\$.18	\$8.46
Oat straw	.6 tons	\$4.00	2.40	.7 tons	\$4.00	\$2.80
Total credits per acre			\$9.60			\$11.26
Net cost per bushel		\$.22			\$.19	
Net profit per acre			-\$1.49			-\$.57

This again, under the conditions prevailing in 1931, might have been an important factor in causing the difference in yield per acre.

The various items entering into the cost of producing oats on 44 Garfield county farms in 1931 are shown in Table XXVII. The average costs per acre were \$11.09 on horse-operated farms and \$11.83 on the farms where the tractor was used in conjunction with horses as a source of power. Due largely to the difference in yield and the larger credit for straw, the net costs per bushel were lower on the horse-and-tractor-operated farms than on the farms where only horses were used, 19 cents as compared with 22 cents per bushel. The average losses per acre in oats were not as large as was the case with wheat as shown in the previous computations. However, it should be noted that oats were credited at a price of 18 cents per bushel which is a smaller decrease from prices prevailing in previous years than wheat. In other words, with a return of anything like normal price relationships, wheat production will likely show greater profits than oat production on these farms. In addition, oat straw was credited in these computations with a value of \$4 per ton while wheat straw was not given a value. This difference in procedure, while borne out by the estimates of the farmers, would largely account for the difference in loss per acre between wheat and oats.

Craig-Mayes Area Oat Production Costs

The usual procedure for seed bed preparation in the Craig-Mayes area was double disking of stalk ground rather than plowing as was the case in Garfield county. Also slightly more labor was used in threshing even though the yield per acre was lower. (Table XXVIII.) The total labor requirements

TABLE XXVIII.—Typical Operations in Producing Oats on Farms Using Horses, Craig-Mayes Area, 1931.

Operation	Date	Size of mach.	NUMBER OF		Times over	Acres per 10-hr. day	TOTAL HOURS PER ACRE	
			Men	Horses			Men	Horses
Disking	Dec.							
	Feb.	7'	1	4	2	12	1.6	3.2
Harrowing	Feb.	12'	1	4	2	25	.8	3.2
Drilling	Feb.	8'	1	4	1	17	.6	2.4
Binding	June	7'	1	4	1	14	.7	2.8
Shocking	June	--	1	--	--	10	1.0	--
Threshing	July		11	16	--	--	3.0	6.0
TOTAL - -							7.7	17.6

per acre were the same in both areas for man labor, 7.7 hours per acre; but slightly less horse labor, 17.6 hours per acre, was used on the average in the Craig-Mayes area.

Land values were distinctly lower in the Craig-Mayes area than in Garfield county. This had the effect of lowering the land charge sharply, as this figure was computed as five per cent of the land value in all of these tabulations. Taxes and general farm expenses were also lower in the Craig-Mayes area. The costs per acre amounted to \$7.90 on the average farm in the Craig-Mayes area. (Table XXIX.) Straw was credited at \$3 per ton. This gave a net cost per bushel of 21 cents and showed an average net loss of \$1.60 per acre.

TABLE XXIX.—Cost of Oats Production, 19 Craig-Mayes Area Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of oats per farm.....49			
Yield per acre bushels.....30			
Costs			
Man labor	7.7 hrs.	\$.16	\$1.23
Horse labor	17.6 hrs.	.08	1.41
Machinery .....			.77
Seed	2.5 bu.	.36	.90
Twine	2.0 lbs.	.11	.22
Threshing	30.0 bu.	.025	.75
General farm expense .....			.86
Taxes on land .....			.41
Land charge	\$27.00	5%	1.35
Total cost per acre..			\$7.90
Credits			
Oats	30.0 bu.	.16	\$4.80
Oat straw .....	.5 ton	3.00	1.50
Total credits per acre..			\$6.30
Net cost per bushel.....		\$.21	
Net profit per acre.....			-\$1.60

Barley Production Costs in Garfield County

The labor requirements in producing barley were, as might be anticipated, generally similar to those for oats. (Tables XXX and XXXI.) The yields per acre of barley were very satisfactory in 1931, averaging 40

TABLE XXX.—Typical Operations in Producing Barley on Farms Using Horses and Tractor, Garfield County, 1931.

Operation	Date	Size of mach.	NUMBER OF		Times over	HOURS PER ACRE		
			Men	Horses		Men	Horses	Tractor
Plowing	July	42"	1	--	1	.8	--	.8
Spring-toothing	Jan.	8'	1	4	1	.6	2.4	--
Harrowing	Feb.	30'	1	--	2	.3	--	.3
Drilling	Feb.	8'	1	4	1	.6	2.4	--
Binding	June	10'	1	--	1	.8	--	.4
Shocking	June		1	--	1	.8	--	--
Threshing	July		10	16		2.5	3.2	--
TOTAL - -						6.4	8.0	1.5

bushels per acre on seven farms on which records were obtained. Where the grain is desired primarily as feed and more straw is not needed, barley is perhaps a more economical crop than oats for the production of feed nutrients in this area.

TABLE XXXI.—Cost of Barley Production, 7 Garfield County Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of barley per farm.....24			
Yield per acre, bushels.....40			
Costs			
Man labor	6.4 hrs.	\$.16	\$1.02
Horse labor	8.0 hrs.	.08	.64
Tractor	1.5 hrs.	.78	1.17
Machinery .....			.72
Seed	1.7 bu.	.50	.85
Twine	2.4 lbs.	.11	.26
Threshing	40.0 bu.	.08	3.20
General farm expense.....			1.06
Taxes on land.....			.51
Land charge	\$45.00	5%	2.25
Total cost per acre.....			\$11.68
Credits			
Barley	40 bu.	\$.25	\$10.00
Net cost per bushel.....		.29	
Net profit per acre.....			-\$1.68

Corn Production Costs in Garfield County

Only a small percentage of the Garfield county farms raised corn in any considerable quantity. On these farms, as is shown in Table XXXII, the preliminary seed bed preparation was generally performed with a trac-

TABLE XXXII.—Typical Operations in Producing Corn, Garfield County, 1931, Using Horse and Tractor

Operation	Date	Size of mach.	NUMBER OF		Times over	HOURS PER ACRE		
			Men	Horses		Men	Tractor	Horses
Plowing	Aug.	42"	1		1	.8	.8	--
Disking								
(tandem)	Mar.	8'	1		1	.4	.4	--
Listing	April	1-row	1	4	1	1.3		5.2
Harrowing	May	12'	1	4	2	.8		3.2
Cultivating	June	1-row	1	2	2	2.6		5.2
Shucking	Oct.		1	2	1	2.9		5.8
TOTAL - -						8.8	1.2	19.4

tor. However, on the farms where this work was performed with horses the labor requirements would be only slightly larger. An average of 8.8 man hours, 1.2 tractor hours and 19.4 horse hours were used per acre in corn production in Garfield county in 1931.

The average yield per acre on these 10 Garfield county farms where production costs were obtained was 17 bushels per acre. This was much below the normal yield on these farms. As pointed out in the earlier portion of this bulletin, the distribution of rainfall was favorable to wheat production in 1931; but the severe drought and excessive temperature in the summer of 1931 were distinctly unfavorable to row crop production.

The average net cost per bushel of corn where no credit was allowed for fodder or value of the standing stalks was 57 cents per bushel. (Table XXXIII.) With corn valued at the close of the year at 35 cents per bushel on these farms, the average net loss was \$3.77 per acre.

TABLE XXXIII.—Costs of Corn Production, 10 Garfield County Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of corn per farm.....	35		
Yield per acre, bushels.....	17		
Costs			
Man labor	8.8 hrs.	\$.16	\$1.41
Horse labor	19.4 hrs.	.08	1.55
Tractor	1.2 hrs.	.75	.90
Machinery .....			.68
Seed	7 lbs.	.02	.14
General farm expense.....			1.08
Taxes on land .....			.71
Land charge	\$65.00	5%	3.25
Total cost per acre ..			\$9.72
Credits			
Corn	17 bu.	\$.35	5.95
Net cost per bushel.....		\$.57	
Net loss per acre.....			-\$3.77

Craig-Mayes Area Corn Production Costs

Considerably more labor was used in the production of corn in the Craig-Mayes area than in Garfield county. (Tables XXXIV and XXXV.) However, with the lower valuations of land the costs per acre were \$8.73 in

TABLE XXXIV.—Typical Operations in Producing Corn, Craig-Mayes Area, 1931.

Operation	Date	Size of mach.	NUMBER OF		Times over	Acres per 10-hr. day	TOTAL HOURS PER ACRE	
			Men	Horses			Men	Horses
Plowing	Dec.	24"	1	4	1	4.5	2.2	8.8
Disking	Mar.	7'	1	4	1	14	0.7	2.8
Harrowing	April	12'	1	4	2	25	0.8	3.2
Planting	April	2-row	1	2	1	14	0.7	1.4
Cultivating	May June	1-row	1	2	4	8	5.2	10.4
Shucking	Oct.		1	2	1	2.5	4.0	8.0
TOTAL - -							13.6	34.6

the Craig-Mayes area as compared with \$9.72 per acre in Garfield county. The corn produced was valued at 25 cents per bushel in the Craig-Mayes area as compared with 35 cents in Garfield county, hence even with the slightly higher yield in the Craig-Mayes area the loss per acre was larger, \$3.98 per acre compared with \$3.77 in Garfield county. On the other hand, the average net cost per bushel was lower in the Craig-Mayes area, 46 cents per bushel where no credit was allowed for the value of the fodder or standing stalks compared with 57 cents in Garfield county.

TABLE XXXV.—Cost of Corn Production, 14 Craig-Mayes Area Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of corn per farm.....38			
Yield of corn per acre, bu....19			
Costs			
Man labor	13.6 hrs.	\$.16	\$2.18
Horse labor	34.6 hrs.	.08	2.77
Seed	7.0 lbs.	.03	.21
Machinery expense .....			.83
General farm expense .....			.95
Taxes on land .....			.44
Land charge	\$27.00	5%	1.35
Total cost per acre...			\$8.73
Credits			
Corn	19.0 bu.	\$.25	\$4.75
Net cost per bushel.....		\$.46	
Net profit per acre.....			-\$3.98

Kafir Production Costs

The man labor requirements in producing kafir were slightly more than those for corn production as shown in Tables XXXIV and XXXVI. This was due in the main to the larger labor requirements in harvesting kafir

TABLE XXXVI.—Typical Operations of Kafir Farms in Craig-Mayes Area, 1931.

Operation	Date	Size of mach.	NUMBER OF		Times over	Acres per 10-hr. day	TOTAL HOURS PER ACRE	
			Men	Horses			Men	Horses
Plowing	May	24'	1	4	1	4.5	2.2	8.8
Disking	April	7'	1	4	1	14.0	.7	2.8
Harrowing	April	10'	1	4	2	20.0	1.0	4.0
Planting	May	2-row	1	2	1	14.0	.7	1.4
Rotary hoeing	June	8'	1	2	1	17.0	.6	1.2
Cultivating	June	1-row	1	2	2	8.0	2.6	5.2
Heading	Nov.		2	2	1	1.5	7.5	7.5
Miscellaneous, including replanting							1.2	2.6
TOTAL - -							16.5	33.5

than corn. The yields of kafir per acre on the small number of farms on which records were obtained were much higher than the corn yields obtained. The per acre costs of the two crops were very similar. However, due to the larger yield per acre the net cost per bushel for kafir amounted to 33 cents in comparison with 46 cents per bushel for corn in the Craig-Mayes area. (Table XXXVII.)

TABLE XXXVII.—Cost of Kafir Production, 5 Craig-Mayes Area Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of kafir per farm ---- 9			
Yield per acre, bushels --- 27			
Costs			
Man labor -----	16.5 hrs.	\$.16	\$2.64
Horse labor -----	33.5 hrs.	.08	2.68
Machinery -----			.74
Seed -----	5.0 lbs.	.04	.20
General farm expense -----			.95
Taxes on land -----			.40
Land charge -----	\$25.00	5%	1.25
Total cost per acre ----			\$8.86
Credits			
Kafir -----	27 bu.	\$.20	\$5.40
Net cost per bushel -----		\$.33	
Net profit per acre -----			-\$3.46

Soybean Production Costs

Soybean production costs were obtained on eight farms in the Craig-Mayes area. Considerable variations occurred in the methods of producing soybeans on various farms in this area. Seed bed preparation methods vary widely from farm to farm and some soybeans are sown broadcast rather than in rows. Also the method and cost of harvesting varies greatly according to whether the beans are to be used for hay or for seed production. (Tables XXXVIII and XXXIX.) The figures obtained in 1931 on these

TABLE XXXVIII.—Typical Operations in Producing Soybeans on Farms in Craig-Mayes Area, 1931.

Operation	Date	Size of mach.	NUMBER OF		Times over	Acres per 10-hr. day	TOTAL HOURS PER ACRE	
			Men	Horses			Men	Horses
Plowing	Dec.	28"	1	4	1	4.5	2.2	8.8
Disking	Feb.	7'	1	4	2	14	1.4	5.6
Harrowing	May	10'	1	4	2	20	1.0	4.0
Planting	May	2-row	1	2	1	14	.7	1.4
Rotary hoe	May	7'	1	2	2	14	1.4	2.8
Cultivating	June	1-row	1	2	1	8	1.3	2.6
Mowing	Aug.	5'	1	2	1	10	1.0	2.0
Raking	Sept.	10'	1	2	1	20	.5	1.0
Shocking	Aug.		1		1	10	1.0	
Stacking	Sept.		2	2	1	10	3.0	3.0
TOTAL - -							13.5	29.2

farms indicate that soybeans were a profitable crop where good use can be made of the hay. No figures were obtained on the cost of production where the beans were threshed and used as feed or sold.

TABLE XXXIX.—Cost of Soybean Production, 8 Craig-Mayes Area Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of soybeans per farm 8			
Yield per acre, tons 13			
Costs			
Man labor	13.5 hrs.	\$.16	\$2.16
Horse labor	29.2 hrs.	.08	2.34
Machinery .....			.87
Seed .....	.5 bu.	2.50	1.25
General farm expense .....			.95
Taxes on land .....			.43
Land charge	\$27.00	5%	1.35
Total cost per acre			<u>\$9.35</u>
Credits			
Soybean hay	1.3 tons	\$6.00	\$7.80
Net cost per ton		\$7.20	
Net profit per acre			-\$1.55

Alfalfa Production Costs

It was found that approximately an hour and a half of man labor and three hours of horse labor per acre per cutting were required in mowing and raking alfalfa hay in Garfield county. In addition to this, hauling and putting the hay in the barn required an average of three hours of man labor and two hours of horse labor per ton. (Table XL.) The total labor requirements in producing alfalfa hay varied widely with the yield obtained.

TABLE XL.—Typical Operations in Producing Alfalfa Hay, 10 Garfield County Farms, 1931.

Operation	Size of mach.	NUMBER OF		Acres per 10-hr. day	HOURS PER ACRE	
		Men	Horses		Men	Horses
Per cutting						
Mowing	5'	1	2	10	1.0	2.0
Raking	10'	1	2	20	.5	1.0
Hauling and putting in barn		3	2		3.0*	2.0*

*Hours per ton.

In 1931 the yield of alfalfa hay in Garfield county was extremely low, amounting on the average to only one ton per acre even though two cuttings were made. When \$1.52 per acre per year, a proportionate amount of the cost of obtaining a stand of alfalfa, was added the total costs amounted to \$8.49 per acre. (Table XLI.) With more nearly normal yields the costs per ton would have been decidedly less. Where alfalfa is adapted to the soil conditions and fair yields per acre can be obtained, alfalfa is one of the most profitable crops raised in Garfield county.

TABLE XLI.—Cost of Alfalfa Production, 10 Garfield County Farms, 1931.

Average	Quantity per acre	Price per unit	Cost per acre
Acres of alfalfa per farm 30			
Yield of alfalfa per acre, tons 1.0			
Number of cuttings 2			
Costs			
Man labor -----	4.5 hrs.	\$.16	\$.72
Horse labor -----	5.0 hrs.	.08	.40
Machinery -----			.78
Proportion of seeding cost -----			1.52
General farm expense -----			1.04
Taxes on land -----			.78
Land charge -----	\$65.00	5%	3.25
Total cost per acre -----			\$8.49
Credits			
Alfalfa -----	1 ton	\$8.00	\$8.00
Net cost per ton -----		\$8.49	
Net profit per acre -----			-\$.49

Summary of Crop Production Costs in 1931 in Northern Oklahoma

Man labor requirements per acre, even with the same crop, varied widely with the kind of power and the size of machinery used. The man labor requirements per acre tended to be lower on the Garfield county farms than in the eastern area primarily because of the larger machinery and power units commonly used.

It is noteworthy that the costs of production of the various crops grown in Garfield county in 1931 were all in close proximity to a figure of \$11 per

TABLE XLII.—Summary of Crop Production Costs in 1931.

Crop	LABOR AND POWER PER ACRE			Yield per acre (bushels)	Cost per acre	Cost per bushel
	Man hours	Horse hours	Tractor hours			
Garfield County						
Wheat	7.4	22.0	---	16.2	\$11.06	\$.62
Wheat	3.0	---	2.1	20.6	10.50	.47
Wheat	4.9	6.4	1.6	21.1	11.23	.49
Oats	7.7	21.0	---	40.0	11.09	.22
Oats	7.2	9.6	1.7	47.0	11.83	.19
Barley	6.4	8.0	1.5	40.0	11.68	.29
Corn	8.8	19.4	1.2	17.0	9.72	.57
Alfalfa	4.5	5.0	---	1 ton	8.49	8.49 per ton
Craig-Mayes Area						
Oats	7.7	17.6	---	30.0	\$7.90	\$.21
Corn	13.6	34.6	---	19.0	8.73	.46
Kafir	16.5	33.5	---	27.0	8.86	.33
Soybeans	13.5	29.2	---	1.3 tons	9.35	7.19 per ton

acre. The total costs per acre varied from \$8.49 per acre of alfalfa to \$11.83 per acre of oats. In the Craig-Mayes area the per acre costs of production were considerably lower, due largely to the lower land values, and centered around an average cost of \$9 per acre except for oats where the average costs totaled slightly under an average of \$8 per acre. (Table XLIII.)

Costs per bushel or per ton are affected greatly by the yield obtained per acre. As previously mentioned, where the yields per acre were abnormally high or low, care should be exercised in interpreting these cost figures. For that reason the per acre costs of production in terms of physical requirements in hours of man labor, horse labor and tractor use, and pounds of seed have been included in this publication, wherever possible, in order that in later years these data may be used with precision in the light of changed price and yield conditions.

PART IV

COSTS OF COTTON PRODUCTION IN SOUTHWESTERN OKLAHOMA, 1929 AND 1931

In the spring of 1930 slightly more than 100 farm management records on the 1929 farm business were secured from farmers in western Tillman county, in the vicinity of Davidson, Tipton and Frederick. This study was centered around the cotton enterprise and data on the cotton production costs for the 1929 crop year were obtained.

At this same time a similar group of records were obtained on 95 farms in the western half of Washita county. Because of the serious decline in cotton prices during the past three years, resulting in considerable changes in cotton production costs and farm practices and organization, it was thought advisable to secure additional information on current conditions in the spring of 1932. Records from 87 identical farms out of the 95 secured in 1929 were secured on the 1931 crop. The data presented in the following tables are of interest and value in that they show the changes that have gone on in cotton production costs as well as the current costs. Some changes also have occurred in the methods of production, the power used and the organization of the farm business. The percentage of the acreage devoted to cotton shows a decline on these farms during the two-year period similar to that taking place throughout the State.

TABLE XLIII.—Standard Rates of Operation in Cotton Production on Tillman County Farms

Operation	Size of machine	CREW			Acres per 10-hr. day	Hours per acre
		Man	Tractor	Horse		
Plowing	2 bottom	1		4	4.5	2.2
Plowing	2 bottom	1	1		7.7	1.3
Listing and planting	2 row	1		6	14.0	0.7
Cutting stalks	2 row	1		3	20.0	0.5
Cutting stalks	4 row	1	1		50.0	0.2
Cultivating	2 row	1		4	17.0	0.6
Cultivating	2 row	1	1		25.0	0.4

In interpreting these data it should be borne in mind that the Tillman county area is not entirely representative of large portions of the cotton belt in Oklahoma. In that county, farms are large, land is high in price, and it is probably as good land for cotton production as will be found in the State. Large machine equipment, either horse-drawn or tractor-operated, is com-

monly used. Cotton production practices as indicated in the tables of typical operations are perhaps representative of conditions in the western half of the State and where large machinery is used. Production costs in the southwest are perhaps as low as in any portion of the State or the entire cotton belt. Labor requirements for cotton in the southwest are particularly low due to the large equipment used and the favorable climatic conditions.

Rates of Operation on Cotton Farms

The common rates of machine operations in the southwest tended to be slightly higher than those found on the average farm in northern Oklahoma. (Tables XXIII and XLIII.) The soil in both areas studied in southwestern Oklahoma is quite sandy and tills easily. Further than that, the work animals are for the most part mules of the best quality which compare favorably with the horses commonly used in the northern part of the State as sources of power. The tractors used were of the general purpose type; practically all of them were Farm-alls, particularly in 1929.

Horse Labor Costs

The costs of horse labor in Tillman county in 1929 and 1931 are presented in Table XLIV. During this period the average annual costs of maintaining a horse decreased practically 50 per cent, from \$115.04 in 1929

TABLE XLIV.—Costs of Horse Labor in Tillman County, 1929 and 1931.

Year	1929	1931
Number of farms	49	54
Average number of horses per farm	7.3	7.1
Average value of horses, per head	\$75.83	\$57.10
Average number hours work, per horse, per year	640	585
Costs per horse		
Depreciation, less sales plus purchases	\$5.37	\$2.67
Interest on investment @ 5%	3.79	2.85
Feed		
Grain	\$46.58	\$23.46
Hay	35.64	12.68
Pasture	4.59	2.27
Total feed cost	\$86.81	\$38.41
Man labor, 40 hours	8.00	6.00
Harness costs	3.66	2.76
Taxes	1.04	.78
Shelter	4.21	3.96
Miscellaneous	2.16	1.13
Total cost per horse	\$115.04	\$58.56
Cost per hour horse labor	\$.18	\$.10

to \$58.56 in 1931. The decrease in feed costs was considerably more than 50 per cent. In 1929 much of the feed was shipped in while in 1931 most of the feed used was home-grown and prices were very low. The average cost of horse labor in Tillman county decreased from 18 cents per hour in 1929 to 10 cents per hour in 1931.

The costs of horse labor in Washita county in 1929 were considerably lower than in Tillman county. (Table XLV.) Annual costs were lower and the costs per hour were 15 cents in comparison with 18 cents in Tillman county. In both areas the horse worked approximately 600 hours per year on the average. Where the horses were used more hours than this the costs were proportionately lower.

TABLE XLV.—Cost of Horse Labor, 70 Farms, Washita County, 1929.

Average number of horses per farm.....		6.07
Average value of horses, per head.....		\$65.35
Average number hours work, per horse.....		600
Costs per horse		
Depreciation, less sales plus purchases.....		\$2.17
Interest @ 5%.....		3.27
Feed cost		
Grain.....	\$46.90	
Hay.....	14.67	
Pasture.....	6.66	
Total feed cost.....		\$68.23
Man labor, 40 hours @ 20¢.....		8.00
Harness costs.....		2.40
Taxes.....		.53
Shelter.....		3.62
Miscellaneous.....		1.76
Total cost per horse.....		\$89.98
Cost per hour of horse labor.....		\$.15

Tractor Operation Costs

Tractor costs of operation also declined somewhat between 1929 and 1931, though not in proportion to the decreases in horse labor costs. (Table XLVI.) The number of farms on which tractors were used in the Tillman county area practically doubled during the two-year period. The annual

TABLE XLVI.—Costs of Tractor Operation in Tillman County, 1929 and 1931.

Items	1929	1931
Number of tractors.....	26	51
Average value of tractors.....	\$710.96	\$455.39
Average number hours worked.....	584	540
Cost per tractor		
Total cash expense—fuel, oil, grease, license.....	\$181.38	\$151.47
Interest @ 5%.....	35.55	22.77
Depreciation.....	135.50	141.66
Repair, labor and miscellaneous.....	35.24	31.59
Total cost per tractor.....	\$387.67	\$347.49
Cost per hour of tractor use.....	\$.66	\$.64

cost decreased approximately \$40, from \$387.67 to \$347.49, between 1929 and 1931. The estimated number of hours of work performed annually also declined somewhat. The average value of tractors also declined noticeably,

due to the fact that an increased percentage of the tractors were not new and hence were given a lower inventory value. This had the effect of lowering the interest charge. Fuel and oil were considerably cheaper in 1931 than in 1929 and reduced the cash expenses sharply. The computed cost per hour of operation for the average tractor in 1929 was 66 cents and in 1931, 64 cents. These tractors were of the general purpose type, Farm-alls for the most part.

Machinery Costs

Machinery costs were considerable items of expense on these cotton farms in southwestern Oklahoma, averaging close to a dollar an acre. The figures presented in Table XLVII do not include the costs of the tractor, automobile or truck maintained on many farms. In contra-distinction to

TABLE XLVII.—Machinery Costs in 1929 and 1931 on Cotton Farms in Southwest Oklahoma

Items	Washita county 1929	Tillman county 1929	Tillman county 1931
Number of farms	72	87	67
Acres in crops per farm	110	193	214
Value of machinery per farm except tractor, automobile and truck	\$302.09	\$543.24	\$447.91
Value of machinery per acre in crops	\$ 2.74	\$ 2.81	\$ 2.09
Costs			
Repairs, oil and grease	\$ 27.74	\$ 34.20	\$ 37.34
Depreciation	27.56	87.72	99.84
Interest @ 5%	15.10	27.16	22.40
Taxes	2.45	7.44	6.14
Miscellaneous costs including shelter and repair labor	14.57	31.30	33.14
Total costs per farm	\$ 87.42	\$187.82	\$198.86
Cost per acre in crops	\$.79	\$.97	\$.93

the popular belief that machine costs are not an important part of cotton production costs, it is well to note that the cost per acre as here shown is slightly more than were machinery costs exclusive of automobile, tractor, truck and combine per acre of crops in Garfield county, a wheat producing county. Depreciation was by far the largest item of machinery, approaching one-half of the total annual cost. This item was particularly heavy on the farms using large tractor equipment.

An important factor affecting the cost of machinery operation is the amount of annual use. Where the acreage is large, much machinery can be used at a low cost per acre. One of the vital problems in the success of cotton farmers in the southwest is the fitting of the size of the farm to the capacity of the most economical machines used in cotton production. A shift to larger equipment without a change in the acreage often results in a loss rather than a gain. Low cotton prices these past three years have held back the introduction of labor-saving equipment. When cotton prices again rise to profitable levels, the problem of adapting the cotton acreage to the machinery and power available will again come to the front.

TABLE XLVIII.—Typical Operations in Producing Cotton in Tillman County, 1929.

Operation	Date	Size of machine	NUMBER OF			Times over	Acres per 10-hr. day	TOTAL HOURS PER ACRE		
			Men	Horses	Tractor			Men	Horses	Tractor
1984 Acres of Cotton on 11 Tractor Farms										
Cutting stalks	Feb.	4 row	1	..	1	1	50	0.2	..	0.2
Listing	Feb.									
	Mar.	2 row	1	..	1	2	20	1.0	..	1.0
Planting	April									
	May	2 row	1	..	1	2	20	1.0	..	1.0
Cultivating	June									
	July	2 row	1	..	1	5	25	2.0	..	2.0
								4.2		4.2
8092 Acres of Cotton on 59 Horse Farms										
Cutting stalks	Feb.	2 row	1	3	..	1	20	0.5	1.5	..
Listing	Feb.									
	Mar.	2 row	1	6	..	2	14	1.4	8.4	..
Planting	April									
	May	2 row	1	6	..	1.5	17	0.9	5.4	..
Cultivating	June									
	July	2 row	1	4	..	3.5	17	2.1	8.4	..
Cultivating	July	2 row	1	2	..	1.5	8	1.8	3.6	..
								6.7	27.3	
1927 Acres of Cotton on Eight Horse and Tractor Farms										
Cutting stalks	Feb.	2 row	1	3	..	1	20	0.5	1.5	..
Listing	Feb.									
	Mar.	2 row	1	..	1	2	20	1.0	..	1.0
Planting	April									
	May	2 row	1	..	1	1.5	20	0.75	..	0.75
Cultivating	June									
	July	2 row	1	..	1	3.5	25	1.4	..	1.4
Cultivating	July	2 row	1	4	..	1.5	17	0.9	3.6	..
								4.6	5.2	3.1

TABLE XLIX.—Typical Operations in Producing Cotton, Tillman County, 1931.

Operation	Date	Size of machine	NUMBER OF			Times over	Acres per 10-hr. day	TOTAL HOURS PER ACRE		
			Men	Horses	Tractors			Men	Horses	Tractors
4266 Acres of Cotton on 23 Tractor Farms										
Cutting stalks	Feb.	4 row	1	—	1	1	50	0.2	—	0.2
Listing	Feb.									
	Mar.	2 row	1	—	1	2	20	1.0	—	1.0
Planting	April									
	May	2 row	1	—	1	2	20	1.0	—	1.0
Cultivating	June									
	July	2 row	1	—	1	1.5	25	1.8	—	1.8
TOTAL								4.0		4.0
3333 Acres of Cotton on 34 Horse-operated Farms										
Cutting stalks	Feb.	2 row	1	3	—	1	20	0.5	1.5	—
Listing	Feb.									
	Mar.	2 row	1	6	—	2	14	1.4	8.4	—
Planting	April									
	May	2 row	1	6	—	1.5	17	0.9	5.4	—
Cultivating	June									
	July	2 row	1	4	—	3	17	1.8	7.2	—
Cultivating	July	1 row	1	2	—	1.5	17	1.8	3.6	—
TOTAL								6.4	26.1	
1514 Acres of Cotton on 10 Horse-and-tractor-operated Farms										
Cutting stalks	Feb.	2 row	1	3	—	1	20	0.5	1.5	—
Listing	Feb.									
	Mar.	2 row	1	—	1	2	20	1.0	—	1.0
Planting	April	2 row	1	—	1	1	20	0.5	—	0.5
	May	2 row	1	6	—	3	17	0.4	3.7	—
Cultivating	June	2 row	1	—	1	2.5	25	1.0	—	1.0
	July	2 row	1	4	—	2	17	1.2	4.8	—
TOTAL								4.6	9.0	2.5

Typical Operations in Cotton Production

Typical operations in producing cotton in Tillman county in 1929 and 1931 are shown in Tables XLVIII and XLIX on farms using tractors, horses and mules, and where a combination of horses and mules and tractor was used. It will be noted that as a rule slightly less total labor was used in cotton production in 1931 than in 1929. This might have been due either to local weather conditions or to a lessening of the degree of the intensity of operation because of the lowered cotton prices. Some decrease in labor occurred in the decreased number of cultivations given the cotton crop. It will also be noted that there was a considerable increase in the number of farms using tractors. In 1929 approximately one-fourth of the farms used a tractor either alone or in conjunction with horses while in 1931 approximately one-half of the farmers among those in this study used a tractor.

Tractors are very economical of man labor. In fact, these investigations led to the conclusion that generally this is the principal advantage of tractors over other sources of power. The increase in the proportions of tractor-operated farms was the principal cause of the decrease, during the period of this investigation, in the average number of hours of man labor required in cotton production from six to five hours aside from chopping and picking as shown in Table LII.

In Washita county the size of equipment used was as a rule much smaller than in Tillman county; the size of team was smaller and few tractors were used in cotton production. The labor requirements per acre, therefore, were much higher on the average on the Washita county farms than on those in Tillman county. (Table L.) Aside from the differences in the number of times the crop was cultivated, the principal variation in

TABLE L.—Typical Operations in Producing Cotton, Washita County, Oklahoma, 1929

Operation	CREW		Size of machine	Times over	Acres per 10-hr. day	HOURS PER ACRE	
	Man	Horse				Man	Horse
Cutting stalks	1	3	2 row	1.0	20.0	0.5	1.5
Plowing	1	3	14"	0.5	2.5	2.0	6.0
			24"	0.5	4.5	1.1	5.5
Harrowing	1	5	2 row	1.0	17.0	0.6	3.0
Planting	1	6	2 row	1.5	14.0	0.7	4.2
Cultivating	1	4	2 row	2.0	17.0	1.2	4.8
Cultivating	1	2	1 row	2.5	8.0	3.0	6.0
TOTAL						9.1	31.0

the operations performed on different farms was in the number of times the crop was planted. The weather was particularly unfavorable in 1929 and many farmers planted the cotton crop three times. These farms on which cotton was planted three times were at a disadvantage in two ways that year. The labor requirement, of course, was increased and this later cotton was also more seriously injured by the severe drought of that summer than the earlier planted cotton. Yields were generally low on the late planted cotton.

Man Labor Costs Are Lower on Tractor Farms

In making a comparison of the relative labor requirements in cotton production between the tractor and horse operated farms, it should be borne in mind that in the Tillman county area most of the horse equipment is two-row, four- and six-mule teams being commonly used. In Washita county at least half of the equipment is two-row equipment. Therefore, the comparison is not between the tractor and small horse equipment such as is commonly used in the eastern part of this State, and the whole eastern cotton belt for that matter, but between the tractor and the largest and most efficient of horse equipment.

The average wages paid hired labor in Oklahoma declined approximately 40 per cent between 1929 and 1931. The value that farmers placed upon their own labor has declined somewhat but not proportionately. In computing cotton production costs for the 1929 crop, a rate of 25 cents per hour was used and in 1931 a wage of 15 cents per hour was used. It is thought that these figures accurately represent conditions as they existed on these farms in the respective periods. These figures supposedly include wages paid in cash, value of board furnished hired labor, housing and other expenses, and in the case of operator and family labor the wage that would have been necessary to hire men to perform similar work. There is no implication that these are adequate returns for the labor of Oklahoma farmers.

The amounts of man labor, horse labor, and tractor work used in producing cotton on farms with various types of power, not including the labor, either hired or family, used in chopping and picking or in marketing the cotton crop, are shown in Table LI. On most of these farms, picking and chopping are as yet hand operations and hence are not influenced by the kind of power used. Much of this hand work is hired on a contract basis in the southwest cotton belt. For the field operations except chopping and picking an average of 6.7 hours of man labor and 27.8 hours of horse labor per acre was required on the average farm using only horses or mules as a source of power in the Tillman county group in 1929. On the tractor-operated farms; 4.2 hours of man labor and a like number of tractor hours were required on the average in producing an acre of cotton. Using the cost per hour of horse labor and of tractor work as shown in previous tabulations (Tables XLIII, XLIV and XLV) the labor and power costs on the horse-operated farms were \$6.68 per acre and on the tractor-operated farms were \$3.84. Both on a percentage basis and absolutely, the saving in 1929 on the tractor-operated farms was much larger for power than for man labor. In 1931 slightly less labor, aside from chopping and picking, was used in producing cotton; and because of the lower wage rates used for man labor and the large decline in horse labor costs and a relatively small decline in tractor costs, the differences in costs per acre of cotton with the different kinds of power were much less striking than in 1929, only 50 cents per acre. Very low prices for horse feed and man labor apparently have wiped out much of the potential advantage of the tractor as an economical source of power in cotton production. Should wages again rise to anything like the 1929 level the advantage of the tractor may again become pronounced.

In Washita county in 1929 the man labor requirements were nearly one-half larger per acre than in Tillman county, due primarily to the smaller equipment used. Horse labor costs per hour were lower in 1929 in Washita county than in Tillman county. However, with the larger amounts of man labor and horse labor used per acre the average labor and power costs per acre were slightly larger, totaling \$6.83 per acre of cotton. Again the reader should be cautioned that in interpreting these data it should be

TABLE LI.—Man Labor Except Chopping and Picking and Power Costs in Cotton Production on Farms Using Various Kinds of Power, Tillman County, 1929 and 1931 and Washita County, 1929.

Items	Hours per acre	Cost per hour	Cost per acre	Hours per acre	Cost per hour	Cost per acre	Hours per acre	Cost per hour	Cost per acre	Hours per acre	Cost per hour	Cost per acre
Tillman County, 1929												
Number of farms	59			11			8			Average of 78		
Kind of power	Horse			Tractor			Horse and tractor					
Average acres of cotton per farm	137			180			241			153		
Man labor, except chopping and picking	6.7	\$0.25	\$1.68	4.2	\$0.25	\$1.05	4.6	\$0.25	\$1.15	6.0	\$0.25	\$1.50
Horse labor	27.8	0.18	5.00				5.2	0.18	0.94	19.6	0.18	3.53
Tractor work				4.2	.664	2.79	3.1	0.664	2.06	1.2	0.664	0.80
Total cost per acre			\$6.68			\$3.84			\$4.15			\$5.83
Tillman County, 1931												
Number of farms	34			23			10			Average of 67		
Kind of power	Horse			Tractor			Horse and tractor					
Average acres of cotton per farm	98			186			151			136		
Man labor, except chopping and picking	6.4	\$0.15	\$0.96	4.0	\$0.15	\$0.60	4.6	\$0.15	\$0.70	5.0	\$0.15	\$0.75
Horse labor	26.1	0.10	2.61				9.0	0.10	0.90	11.0	0.10	1.10
Tractor work				4.0	0.643	2.57	2.5	0.643	1.61	2.2	0.643	0.14
Total cost per acre			\$3.57			\$3.17			\$3.21			\$3.26
Washita County, 1929												
Number of farms	70											
Kind of power	Horse											
Average acres of cotton per farm	72											
Man labor, except chopping and picking	9.1	\$0.25	\$2.28									
Horse labor	31.0	0.15	4.65									
Total cost per acre			\$6.93									

recognized that variations in method and intensity of operation and equipment used influence the input of labor greatly from farm to farm and that the figures presented in the accompanying tables are averages showing the costs on actual farms in groups. Costs on individual farms could and did vary widely from the figures presented here.

Machinery costs varied somewhat with the type of power used. That is, the small farm with relatively inadequate equipment oftentimes had nearly as high or higher costs of machinery per acre as the well equipped large farm where the machinery was used to full capacity because of the larger acreage of cotton.

Average Cotton Production Costs

Cotton production costs on the farms using various kinds of power are not shown because of the wide variations in the yield of cotton from farm to farm. It was not felt that the number of farms in some of the groups was sufficient, particularly where there were 10 or less farms in a group, to secure a yield figure which was representative of that which could be reasonably expected. The smaller horse-operated farms employing the labor of the family and the farmer for the most part secured the highest yields per acre on the average in both years of this investigation.

The yield of cotton on some of the tractor-operated farms was as high as on individual horse-operated farms. Any one of several reasons for the lower average yield of the tractor-operated group in both 1929 and 1931 might be given. The average value of cotton land per acre as estimated by the farmer for his individual farm was slightly below average for the tractor-operated group. This slight difference in land valuation was perhaps a less than proportionate reflection of the difference in production capacity, as the superior land in a community is generally under-priced relative to its real value in comparison with the average or inferior grades of land. Also tractors are a new source of power on many of these farms; in many instances the operator has had no previous experience in using a tractor in cotton production. The machinery used is not identical in all cases between the tractor and horse-operated groups. For example, the cultivator is pulled behind the horse or mules, while, with the tractor, the cultivator is attached rigidly to the tractor frame and without careful attention on the part of the tractor-operator much damage to the cotton plants may be done. Further than that, the tractor is often driven at a higher rate of speed in cotton cultivation than that attained with horses and mules and greater injury to the cotton plants from covering or root pruning may result. Carelessness of operation with tractors in cotton production is more serious in its effects on yield than is the case when mules or horses are used.

Offsetting these disadvantages of the tractor in cotton production, most of which are due to the operator and his lack of experience with this type of power, the tractor has some features that give it a real advantage over animal power. That the tractor can be operated at a higher rate of speed than that commonly attained with mules, where such speed does not result in injury to the crop, and that tractors can be used 24 hours a day if necessary in rush times, are factors of no small importance. Timeliness as well as thoroughness of seed bed preparation, planting and cultivating is important among the factors determining the yield of cotton. In the element of timeliness tractors have a distinct advantage over animal power.

Yield per acre is an important factor in determining costs per unit of production. Hence it is easy to dissipate considerable savings in labor

and power costs through reductions in yield. The effect of the kind of power and equipment used on cotton yields is worthy of further study on the part of farmers and implement manufacturers. Some significance should be attached to the fact that the average yield of cotton was lower in both years of this investigation on the tractor-operated farms than on those using horses and mules. A part of this difference may have been due to differences in the quality of land; more of it may have been due to the carelessness or inexperience of the tractor operators. Certainly all of these points should be given careful consideration by farmers in deciding what source of power will prove most economical on their farms. In addition to these considerations, other questions of importance are the adaptation of the kind of power to the other lines of production besides cotton production, followed on the farm, and the size of power unit that can be used most economically on a particular farm.

The larger farms varied widely in yield per acre, but averaged lower than the small farms. This was due either to the type of power used, the use of hired rather than family labor, or other causes which the limited number of records available did not indicate clearly. With identical yields the net costs of cotton production per pound in 1929 would have been approximately one cent per pound lower on the tractor-operated farms than on the horse-operated farms. In the tabulations of the results of labor income per farm in 1929 it was found that the tractor-operated farms, even with slightly lower yields per acre, made labor incomes averaging approximately \$600 more per farm than the average of the horse-operated. The average labor income on 70 farms using only mules and horses was \$1420 in 1929 while on the 28 farms on which a tractor was used either alone or in conjunction with mules, the average labor income was \$2032. This difference in labor income was not entirely due to the lower power costs of the tractor, but rather to the fact that cotton production was profitable and a larger acreage of cotton per farm was commonly found on the tractor-operated farms. The average acreage of cotton was 198 on the tractor-operated farms and 143 on the mule-operated farms. Differences in size of business may be a more important factor in determining farm profits or losses than differences in cost of production per unit.

Where size of equipment and costs of power are intermingled with the most efficient or current size of enterprise, it is difficult to ascertain the true relationships of all factors. It is apparent that in 1929 the tractor was associated with large farm profits due both to its greater efficiency in man labor and power costs and also to the fact that the tractor was generally found on the large farms. In 1931, when cotton prices were generally below the costs of production the slight difference in efficiency in favor of the tractor was not sufficient to offset the disadvantage of the larger acreage associated with mechanical power.

The average cost of production on the 78 farms in Tillman county, Oklahoma, in 1929 amounted to \$36.33 per acre while in 1931 on 67 of these farms the average cost was \$21.69 per acre. (Table LII.) In addition to the decrease in man labor and power costs previously mentioned, it will be noted that land values were depreciated approximately one-third during the period of investigation, averaging \$149.40 in 1929 and \$100.40 in 1931. Ginning and picking costs declined sharply, similar to the decline noted in other wage rates. General farm expenses declined slightly more than 50 per cent on these farms between 1929 and 1931. As previously stated in connection with crop production costs in northern Oklahoma, this item covers the general overhead items such as a proportionate share of the farm automobile and telephone expense, supervision of the operator, and similar items of general farm overhead expense. In 1929 these overhead costs were large. In 1931 they had been reduced to the minimum on most farms, yet this item still amounted to a considerable figure, averaging \$2.23 cents per acre for

cotton. The decline in the value of cottonseed was even more drastic than the decline in cotton lint prices. In 1929 the value of the cottonseed more than offset the ginning costs and left a comfortable premium of approximately \$1.50 an acre. With the very low seed values prevailing in 1931 the value of the seed was less than one-half of the ginning costs. The ginning rates had been reduced, but not in proportion to the reduction in price of cottonseed.

**TABLE LII.—Cost of Cotton Production, Tillman County, Oklahoma
1929 and 1931.**

Items	1929 AVERAGE OF 78 FARMS			1931 AVERAGE OF 67 FARMS		
	Quantity per acre	Cost per unit	Cost per acre	Quantity per acre	Cost per unit	Cost per acre
Acres of cotton per farm		153			136.0	
Yield per acre, pounds		258			260.6	
Costs per acre						
Man labor, operator	6.0 hrs.	\$0.25	\$1.50	5.0 hrs.	\$0.15	\$.75
Contract labor						
Chopping			1.40			.64
Picking			8.42			3.43
Horse labor	19.6 hrs.	0.18	3.53	11.0 hrs.	0.10	1.10
Tractor	1.2 hrs.	0.67	.80	2.2 hrs.	0.64	1.41
Seed			1.19			.82
Machinery			.98			.93
Marketing costs			.86			.52
Ginning expense			4.45			3.62
Taxes			1.14			1.22
Land charge	\$149.40	5%	7.47	\$100.40	5%	5.02
General farm exp.			4.59			2.23
Total cost per acre			\$36.33			\$21.69
Credits						
Cotton	258 lbs.	\$0.14	\$36.19	260.6 lbs.	\$0.05	\$13.03
Cottonseed	380 lbs.	0.0157	5.97	387.0 lbs.	0.0045	1.74
Total credits			\$42.16			\$14.77
Net cost per pound, cents		11.77			7.66	
Net profit per acre			\$5.83			Net loss per acre \$6.92

These cotton cost figures are perhaps less than the average of the State in the respective years. As previously indicated, labor and power were used very efficiently in these areas. To be sure, land values were above the average of the State. However, the yields were more than proportionately above the State average. The average yield of cotton in Oklahoma in 1929, according to the Federal Division of Crop and Livestock Estimates, was 128 pounds per acre; and in 1931 it was 176 pounds per acre.¹ Cotton production costs as found on these farms in 1929 averaged 11.77 cents per pound, and in 1931 they were 7.66 cents per pound. With practically identical

¹United States Department of Agriculture Yearbook, 1932, p. 661.

yields in the two years the net profit was \$5.18 per acre in 1929 when the lint was sold at 14 cents per pound, and in 1931 there was a loss of \$6.92 per acre when the lint brought an average of 5 cents per pound.

Cotton was produced on the farms under investigation in Washita county in 1929 at slightly less cost per acre and per pound than in Tillman county. (Table LIII.) More man labor and horse labor per acre was used in Washita county than in Tillman, but the costs of horse labor per hour

TABLE LIII.—Cotton Production Costs, 70 Washita County Farms, 1929.

Items	Quantity per acre	Cost per unit	Cost per acre
Acres of cotton per farm		72	
Yield per acre, pounds		241	
Average cost per acre			
Man labor, operator	9.1 hrs	\$0.25	\$2.28
Horse labor	31.0 hrs.	0.15	4.65
Contract labor			
Chopping			1.51
Picking			9.59
Seed			1.04
Machinery			0.79
Marketing			0.80
Ginning expense			3.93
Taxes			0.62
Land charge	\$76.60	5%	3.83
General farm expense			3.25
Total costs per acre			\$32.29
Credits per acre			
Cotton	241 lbs.	\$0.15	\$36.15
Cottonseed	385 lbs.	0.015	5.78
Total credits per acre			\$41.93
Net cost per pound		\$0.11	
Net profit per acre			\$9.64

were lower in the northern area. The difference in the valuation of land was, however, the principal cause of the difference in the costs per acre in the two areas. In 1929 the average acre of cotton land in the Tillman county area was valued at \$149.40 while in Washita county cotton land was valued at an average of \$76.60 per acre, nearly one-half less. The average yield of cotton in Washita county was but little less than in Tillman county, 241 pounds compared with 258 pounds.

The average cost of cotton production was 11.77 cents per pound in Tillman county and 11 cents in Washita county in 1929. The net profit per acre was \$9.64 in Washita county, nearly double the net gain of \$5.83 per acre in Tillman county. In addition to the somewhat lower costs per pound in Washita county, the cotton was of better quality and longer staple and sold for an average of a cent a pound more than the Tillman county cotton. More than 90 per cent of the cotton grown on the Tillman county farms was of the Half and Half variety, while most of the cotton grown in Washita county in 1929 was of the Mebane strain, Russel Big Boll, Kasch, or Acala.