

A TENTATIVE ANALYSIS OF DAIRY FARMING  
IN THE ARKANSAS RIVER VALLEY  
(TYPE OF FARMING AREA NINE)  
OF EASTERN OKLAHOMA

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## CHAPTER I.

## INTRODUCTION

## Purpose, Scope, and Method of Study

This investigation is part of a larger study of agricultural adjustments in the Arkansas River Valley area of Eastern Oklahoma conducted cooperatively by the Oklahoma Agricultural Experiment Station and the Bureau of Agricultural Economics of the United States Department of Agriculture. The original purpose of the main study was to "find profitable combinations of enterprises and methods of farming" for the area.<sup>1</sup> It was based on a sample of 1544 farm schedules from the 1945 federal census of agriculture, supplemented with 129 survey schedules obtained by personal interviews covering the year 1948.

This study attempts to analyze important factors and relationships for dairy farming, including the relative economic advantages or disadvantages of dairying in comparison to other alternatives in the area, insofar as these could be determined from the data analyzed. The data available for the dairy farming analysis included 26 schedules of farms classified by the Census Bureau as "dairy farms", to which were added 24 other farms that milked five or more cows in the year covered by the survey. These farms met the following census definitions: 10 "cotton farms", 8 "cotton-cattle farms", 3 "cattle farms", and 3 "vegetable farms". Of the total of 50 records available, 20 were omitted for the following reasons: 16 were not sufficiently complete to be summarized on a basis comparable to the other records,

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<sup>1</sup> Bureau of Agricultural Economics, United States Department of Agriculture, Analysis of Farm Organization and Agricultural Trends, Arkansas River Valley (Type of Farming Area 9) Eastern Oklahoma. Washington, D. C., September, 1947, p. 70.



and four were taken on farms operated by men with full-time employment off the farm. The remaining 30 were completed by imputing certain data from the averages of agricultural statistics reported by the Bureau of Agricultural Economics, the Georgia Agricultural Experiment Station Bulletin 256,<sup>2</sup> or from averages computed from those survey schedules in the larger study for which the needed data were enumerated. These 30 records provide the basis for the dairy farming analyses. For certain analyses varying numbers of records were not used; attempts were made to select groups of similar farms so that the variation in one factor, associated with variations in another, could be observed while others remained fairly constant. The number of farm records used is indicated in all cases.

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<sup>2</sup> J. C. Elrod and W. T. Fullilove, Cost and Utilization of Tractor Power and Equipment on Farms in the Lower Piedmont, January, 1948, pp. 24-29.

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CHAPTER II.

HISTORY AND TRENDS

The specific part of the Arkansas River Valley selected for study is known as Oklahoma Type of Farming Area Nine; it comprises seven counties and has four major towns (Fig. 1). These seven counties were a part of the Cherokee, Creek, and Choctaw Nations until 1907 when Indian Territory was combined with Oklahoma Territory and admitted to statehood.

The unique manner of settlement of Indian Territory, unlike the rest of Oklahoma, was conducive to small farms, a dense rural population, and low farm incomes.<sup>1</sup>

Tables I and II indicate that there has been a trend to a more extensive type of agriculture in which farm sizes increased and the farm population decreased. Cotton acreages, at one time the most important in the area, decreased from 21.4 percent of all farm land in 1929 to 7.6 percent in 1944. The number of acres planted to feed crops remained fairly constant, but there has been a shift from corn to feed crops that are better adapted to the soil and climatic conditions of the region. Pasture acreages, showing an increase from 32.0 percent of all farm land in 1929 to 51.0 percent in 1944, absorbed the acres no longer planted to crops. These shifts in land use have been accompanied by an increased concentration of animal units in the area, a greater proportion of which represent high forage consuming types of livestock. Pasture acres per forage-consuming animal unit increased while acres of feed crops per animal unit decreased.

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<sup>1</sup> For a thorough discussion of the manner of settlement and its influence, see Donald S. Moore, Some Factors Affecting Intensity and Size of Farms in Muskogee County, Master's thesis, Oklahoma Agricultural and Mechanical College Library, 1940, pp. 22-59.

Table I. Percentage of All Land In Farms,  
By Designated Classification, 1929-1944.

Type of Farming Area No. 9	1930	1935	1940	1945
All Land in Farms (Acres)	2,058,442	2,209,871	2,170,587	2,246,157
Percent of all Land in Farms	56.4	60.5	59.4	61.4
Percent of Farm Land in Crops	59.3	53.5	48.2	41.0
Percent of Farm Land in Harvested Crops	51.4	41.7	38.5	37.1
Percent in:				
Cotton	21.4	13.9	9.6	7.6
Wheat	.3	.2	.9	1.0
Corn	20.3	14.2	13.9	12.3
Oats	3.0	3.7	5.2	5.4
Grain Sorghums	1.0	2.9	2.2	2.8
Hay	3.6	5.1	3.9	4.6
Other Crops	1.8	1.7	2.8	3.4
Idle, Fallow	4.9	7.4	8.5	3.0
Failure	3.0	4.5	1.1	.8
Pasture	32.0	34.7	41.7	51.0
Woodland Not Pastured	3.2	4.6	3.9	3.0
All Other Land in Farms	5.4	7.2	6.2	5.0
Number of Farms (Number)	23,893	25,231	19,816	18,797
Average Size Farm (Acres)	86.2	87.6	109.5	119.5

SOURCE: Agricultural Census, 1930 through 1945.

Table II. Trends in Livestock Numbers and Farm  
Land Acres Used For Feed, 1930-1945

Type of Livestock	1930	1935	1940	1945
Workstock (Numbers)	77,125	66,282	56,623	50,971
Cattle and Calves (Numbers)	104,523	182,850	159,188	212,780
Dairy Cows (Numbers)	47,800	66,300	66,000	80,700
Dairy Cows (Percent of All)	45.7	36.3	41.5	37.93
Sheep and Lambs (Numbers)	2,393	3,490	8,716	4,973
Total (Grazing Animal Units)	153,921	196,007	173,855	204,714
Hogs and Pigs (Numbers)	110,987	94,287	83,197	82,590
Chickens (Numbers)	871,213	774,372	770,711	882,307
Total (Animal Units)	182,355	220,506	196,346	228,213
Feed Crops (Acres)	574,305	572,355	546,988	572,770
Feed Crops (Acres per Animal Unit)	3.15	2.60	2.79	2.51
Pasture (Acres)	658,701	766,825	905,135	1,145,540
Pasture (Acres per Grazing Animal Unit)	4.28	3.91	5.21	5.60

SOURCES: United States Census 1930 through 1945, and A Statistical Handbook of Oklahoma Agriculture, Experiment Station Miscellaneous Publication MP-14, Oklahoma Agricultural Experiment Station, Stillwater, Oklahoma, 1949.

The purpose of this study is not to attempt an explanation of why the shift has occurred; it seems sufficient to note that it has. It is probable that when an area is in the process of a major adjustment there is more than the usual amount of variation in farm organizations, methods of farming, and incomes; it seems desirable to correlate the variations in organizations and methods with variations in incomes.

Market outlets for agricultural commodities are shown in Figure I. Figure II shows the distribution of major soil groups.

Figure I Market Outlets for Agricultural Commodities

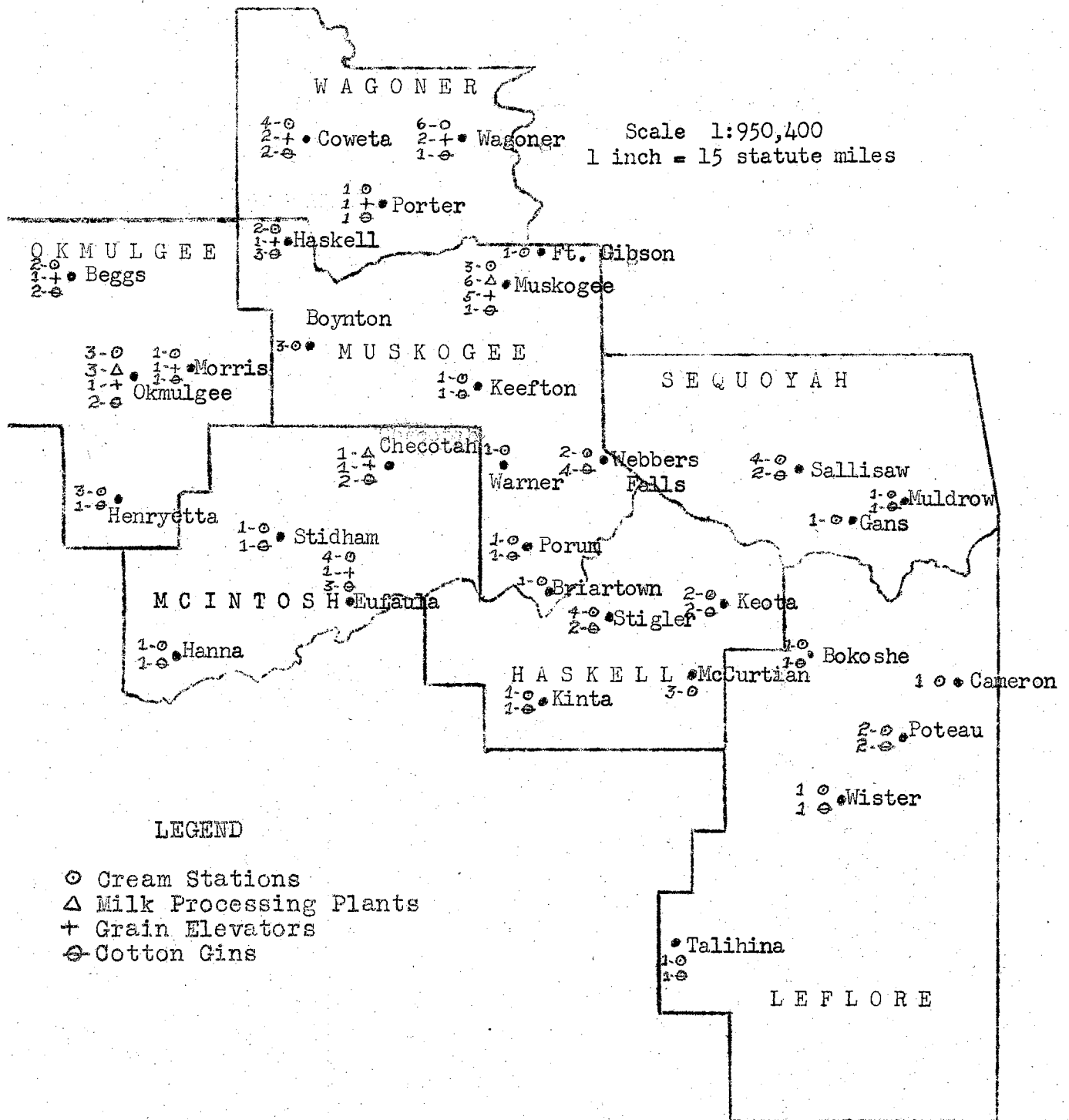
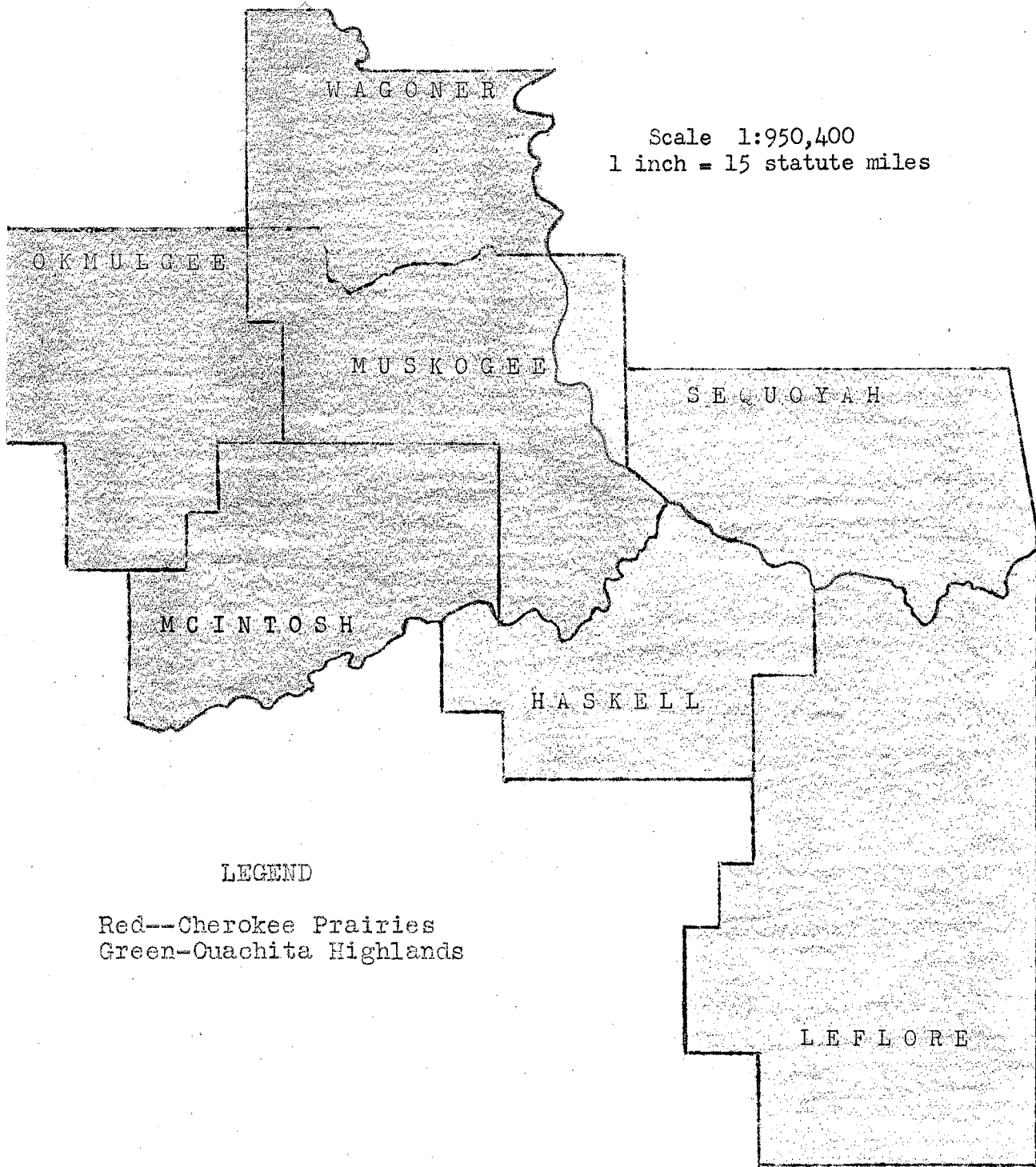


Figure II Major Soil Groups



CHAPTER III.

FARM BUSINESSES ANALYZED.

For descriptive purposes the 30 farms were divided into three groups of 10 farms each on the basis of the quantity of productive services used annually; the measure used for this was total Annual Costs.<sup>1</sup> These groups were then sub-divided on the basis of the percent of "productive man work units"<sup>2</sup> devoted to livestock. The reasons behind grouping the farms in this manner were:

1. In a purely competitive economy a farmer could shift from one type of farming to another of equal size, if size is measured by total annual costs, merely by exchanging the productive services currently under his command for the productive services required for the other type of farming. This applies to the farmers of Type of Farming Area Nine to the extent that they are competitive.
2. Three groups of farms are represented among these 30 and are as follows:
  - a) farms concentrating in livestock production with few crops
  - b) farms on which concentration of livestock and crop enterprises are about equal
  - c) farms concentrating in the production of crops, but having a few livestock.

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<sup>1</sup> The term "Annual Costs" implies the sum of all out of pocket expenses plus charges for depreciation of capital goods, unpaid family labor, operator labor, and capital invested. The only costs not included are the costs of entrepreneurship.

<sup>2</sup> A "Productive Man Work Unit" represents the amount of directly productive work accomplished in 10 hours at the average rate of accomplishment.



3. If the above two reasons are true, we now have the farms divided so that we can compare one type of farming with another to which a shift could be made without increasing the farmer's command over productive services. That is, of course, if we allow enough time for all costs to become variable and for the farm operator to acquire the technical knowledge for the new type of farming.
4. The percent of total man work units devoted to livestock was used instead of the percent of total annual cost devoted to livestock because of the difficulty of separating crop and livestock costs.

#### Capital Distribution

Total investment per farm ranged from \$4,114 to \$60,613; both extremes were on farms specializing in livestock production. No consistent difference existed between types of farms as to the amount of total investment required per unit of size.<sup>3</sup> Only medium sized farms concentrating in crop production appeared greatly different in this respect; this difference was due to the exceptional degree of mechanization of one farm on which only operator labor was used. In all size groups the proportion of capital invested in real estate was highest on farms concentrating on crop production; livestock farms were second and diversified farms third. Diversified farms in the small and medium size groups had a greater proportion of their capital in the form of equipment; this may have been due to the need for relatively complete "sets" of equipment for both livestock and crop enterprises when diversification was practiced. Large

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<sup>3</sup> Size measured by "Annual Costs".

Table III. Capital, Distribution by Size (Annual Costs) and Livestock Specialization Groups, 1948

Size and Type of Farm <sup>1</sup>	Number of Farms	Total Capital	Dollars			Percent of Total Capital			Average Total Annual Costs Dollars <sup>2</sup>	Average Total Man Work Units Units <sup>2</sup>
			Real Estate	Equip- ment	Live- stock	Real Estate	Equip- ment	Live- stock		
<b>Small (\$1,729-\$3,616):</b>										
Crop (27.27-38.37)	2	7,968.5	5,285.5	694.5	1,310.5	66.33	8.72	16.45	2,976	204
Diversified (42.43-65.24)	5	7,930.5	3,763.4	823.0	2,446.4	47.47	10.38	30.85	2,942	275
Livestock (84.34-92.59)	3	5,990.0	3,292.0	447.0	1,974.0	54.96	7.46	32.95	2,505	129
All	10	7,355.9	3,926.4	684.5	2,077.5	53.38	9.31	29.60		
<b>Medium (\$3,686-\$7,249):</b>										
Crop (26.43-27.34)	2	18,900.5	11,493.0	1,820.5	1,520.0	60.81	9.63	8.04	4,451	385
Diversified (45.71-51.91)	4	10,102.0	5,337.3	1,096.5	2,411.1	52.83	10.85	23.87	4,672	276
Livestock (83.98-99.35)	4	15,547.3	8,729.0	1,154.3	4,894.3	56.15	7.42	31.48	5,512	279
All	10	14,039.8	7,925.1	1,264.3	3,226.3	56.45	9.01	22.98		
<b>Large (\$7,502-\$23,997):</b>										
Crop (13.77-26.30)	2	18,895.0	10,429.0	2,271.0	2,865.0	55.19	12.01	15.16	8,073	842
Diversified (66.82-69.06)	2	32,108.0	16,195.0	2,402.0	10,755.0	50.44	7.48	33.50	11,446	529
Livestock (80.24-99.34)	6	35,729.3	19,438.7	2,245.5	8,680.0	54.41	6.28	24.27	14,055	596
All	10	31,638.2	16,987.9	2,281.9	7,931.9	53.69	7.21	25.07		

<sup>1</sup> The numbers in parentheses following the words, small, medium, and large, designated the range in total annual costs per farm; those following the words, crop, diversified, and livestock, designated the range in the percent of man work units devoted to livestock.

<sup>2</sup> These columns are presented to give the reader a better idea of variations in size within the size groups.

crop farms had a greater proportion of the total investment in equipment than any other group and although using more family labor than other groups also had the highest average labor efficiency. This probably indicated large scale mechanized operations. On the smaller farms the proportion of capital invested in livestock increased with increased livestock specialization, but among the larger farms, those with a medium degree of specialization in livestock had the largest proportion of capital invested in it. This was due to a low value per animal unit, a larger proportion of which represented cattle not milked, on large farms with extreme livestock specialization.

#### Land Use Distribution

Total productive land per farm varied from an average of 123.2 acres in the group of small farms to 283 acres in the group of large farms.<sup>4</sup> The average acreage of productive land increased as annual costs increased; this increase was consistent only on crop farms. Medium sized livestock farms averaged six acres less of productive land than small livestock farms while medium sized diversified farms averaged only ten acres more than the small diversified farms. Small and medium sized livestock farms had approximately the same number of acres in crops and in pasture. The medium sized farms obtained their additional size by having more than twice as many animal units as did the small livestock farms. The extra feed needed for this livestock was acquired through higher crop production rates, purchases, and probably improved pastures. The additional

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<sup>4</sup> The term "Productive Acres" implies only cropland, meadow, and pasture.

Table IV. Land Use, Distribution by Size (Annual Costs) and Degree of Livestock Specialization Groups, 1948

Size and type of farm <sup>1</sup>	Number of farms	Productive land : Acres Per Farm					Productive land : Percent of Productive Acres				
		All crops	Wheat and cotton <sup>2</sup>	Other crops	Pasture	All crops	Wheat and cotton	Other crops	Pasture		
<b>Small:</b>											
Crop	2	99.5	83.0	13.5	69.5	16.5	100	83.42	13.57	69.85	16.58
Diversified	5	103.0	43.6	11.5	32.1	59.4	100	42.33	11.17	31.17	57.67
Live-stock	3	124.0	15.7	0.0	15.7	108.3	100	12.66	0.0	12.66	87.34
ALL	10	108.6	43.1	8.5	34.7	65.6	100	39.68	7.82	31.95	60.40
<b>Medium:</b>											
Crop	2	186.0	103.5	38.5	65.0	82.5	100	55.65	20.70	34.95	44.35
Diversified	4	113.5	63.5	13.3	50.3	50.0	100	55.95	11.72	44.17	44.05
Live-stock	4	118.0	18.0	0.0	18.0	100.0	100	15.25	0.0	15.25	84.75
ALL	10	129.8	53.3	13.0	40.3	76.5	100	41.06	10.01	31.05	58.94
<b>Large:</b>											
Crop	2	293.0	223.0	87.5	135.5	70.0	100	76.11	29.86	46.25	23.89
Diversified	2	298.5	152.5	15.5	137.5	140.0	100	51.09	5.2	46.06	48.91
Live-stock	6	274.6	59.0	0.0	59.0	215.6	100	21.49	0.0	21.49	78.51
ALL	10	283.0	110.5	20.5	90.0	172.5	100	39.05	7.24	31.80	60.95

<sup>1</sup> These farms are classified the same as they were in Table III.

<sup>2</sup> Wheat was planted on only one farm.

size of the medium sized diversified farms over small diversified farms was apparently due only to greater out-of-pocket expenses; in other respects they appeared to be of approximately the same size.

Acres of cropland per farm ranged from 0 to 240. The proportion of all productive land in crops was inversely related to the degree of specialization in livestock except in the group of medium sized farms. In this latter group, those that were classed as diversified had about the same ratio of crop to pasture land but relatively more livestock than did the crop farms. Crop-farms had a greater proportion of this productive land in cotton or wheat than did diversified farms.<sup>5</sup> Livestock farms produced no cotton or wheat. The proportion of all productive land producing other crops tended to decrease as livestock specialization increased, except on the medium sized farms.

Table V. Crops, Acreages and Yields

Crop	: Number : of Farms	: Acres per: : Farm	: Average : Yields	: Percent of all : Land in Crops
Corn	23	26.7	25.08 bu.	33.1
Cotton	16	20.9	113,400 lbs. s/c	18.0
Oats	8	33.8	23.25 bu.	14.5
Barley	1	15	30 bu.	0.8
Wheat	1	30	12 bu.	1.6
Grain Sorghums	4	16.2	7.32 bu.	3.5
Forage Sorghums	8	15.3	1.32 tons	7.4
Alfalfa Hay	1	12	3 tons	0.6
Prairie Hay	7	33.1	1.42 tons	15.7
Other Hay	9	9.5	0.8 tons	4.6

<sup>5</sup> Only one farm had wheat.

Table VI. Livestock Distribution by Size (Annual Costs) and Livestock Specialization Groups, 1948

Size and Type of farm	Number of Farms		Dairy cows			Animal units per farm			Percent of all animal units			
	(Number)	(Number)	cattle	Hogs	Other	Other	Dairy cows	Dairy	Other	Hogs	Other	
<b>Small:</b>												
Crop	2	4.2	1.7	0.4	0.5	0.5	61.62	24.89	6.52	7.0		
Diversified	5	6.1	6.9	0.9	0.9	0.9	41.22	46.62	6.00	6.1		
Livestock	3	7.2	4.5	0.3	0.8	0.8	56.12	35.26	2.08	6.6		
ALL	10	6.1	5.1	0.6	0.8	0.8	48.36	40.35	4.93	6.4		
<b>Medium:</b>												
Crop	2	6.8	2.8	0.9	0.8	0.8	60.33	25.09	7.88	6.7		
Diversified	4	10.1	2.8	0.9	1.7	1.7	65.16	18.06	5.81	11.0		
Livestock	4	19.9	6.7	1.2	0.4	0.4	70.82	23.75	4.11	1.3		
ALL	10	13.4	4.4	1.0	0.5	0.5	69.43	22.40	4.96	2.4		
<b>Large:</b>												
Crop	2	11.0	5.8	0.9	1.0	1.0	58.96	30.92	4.76	5.4		
Diversified	2	25.7	15.8	0.4	1.4	1.4	59.31	36.54	1.03	3.1		
Livestock	6	41.3	17.6	0.0	1.3	1.3	68.51	29.27	0.00	2.2		
ALL	10	32.1	14.9	0.3	1.3	1.3	66.09	30.74	0.55	2.6		

1 These farms were classified the same as in Table III.

### Crops, Acreages and Yields

Corn occupied a greater proportion of all cropland than any other crop, with cotton, prairie hay, and oats following next as listed; combined, these four crops occupied 81.3 percent of all cropland.

### Livestock Distribution

In all size groups, except that of small farms, the average number of animal units per farm and the proportion of animal units representing dairy cows increased with livestock specialization. High concentrate consuming types of animals composed a greater proportion of the average total animal units on crops and diversified farms than on livestock farms. As livestock farms increased in size a greater proportion of the average total animal units was composed of cattle but not necessarily dairy cows; on medium sized livestock farms 70.82 percent of all animal units represented dairy cows and 23.75 percent represented other cattle, while on large livestock farms only 68.51 percent of all animal units represented dairy cows and 29.27 percent represented other cattle. The survey schedules were not always taken so that the dairy and beef enterprises could be separated.

### Receipts Distribution

In all three types of farms total receipts increased with increased size. Total receipts varied from an average of \$1,768 for small livestock farms to \$17,517 for large diversified farms. The percent of total receipts from crops was higher on those farms specializing in crop production and

Table VII. Receipts, Distribution by Size (Annual Costs) and Livestock Specialization Groups, 1948

Size and Type of Farm <sup>1</sup>	Number of Farms	Dollars							Percent of Total Receipts				
		Total Receipts	Crops	Livestock Products	Livestock Increase	Miscel- laneous	Home Used	Crops	Livestock Products	Livestock Increase	Miscel- laneous	Home Used	
<b>Small:</b>													
Crop	2	3,100.5	1,809.5	537.5	477.5	37.5	234.5	58.36	17.34	15.40	1.21	7.56	
Diversified	5	3,769.0	815.4	1,888.2	619.4	158.8	245.2	22.59	50.10	16.43	4.21	6.51	
Livestock	3	1,768.3	62.7	893.3	154.0	4.3	354.0	3.55	50.53	25.68	0.24	20.02	
All	10	3,035.1	810.3	1,319.6	541.3	88.2	275.7	26.70	43.48	17.83	2.91	9.02	
<b>Medium:</b>													
Crop	2	5,415.5	3,183.5	1,421.0	423.0	37.5	350.5	58.78	26.24	7.81	0.69	6.47	
Diversified	4	4,592.7	1,369.3	2,261.5	751.3	72.5	138.3	29.81	49.24	16.36	1.58	3.01	
Livestock	4	10,126.5	0	8,200.5	1,302.7	0	623.3	0	80.98	12.86	0	6.16	
All	10	6,970.8	1,184.4	4,469.0	906.2	36.5	374.7	16.99	64.11	13.00	0.52	5.38	
<b>Large:</b>													
Crop	2	14,447.0	10,997.0	1,625.0	933.	218.0	675.0	76.12	11.25	6.46	1.51	4.67	
Diversified	2	17,517.0	447.0	12,977.0	3,459.	165.0	468.0	2.55	74.08	19.75	0.94	2.67	
Livestock	6	17,403.0	349.8	13,390.3	2,934.8	107.0	620.5	2.01	76.94	16.86	0.61	3.57	
All	10	16,834.9	2,498.8	10,954.4	2,639.3	141.2	801.0	14.84	65.07	15.68	0.84	3.57	

<sup>1</sup> These farms were classified the same as they were in Table III.



lowest for those specializing in livestock production. The proportion of total receipts received from crops averaged much more on large crop farms than on medium and small crop farms, while large diversified farms received a much smaller proportion of their total receipts from crops than did other diversified farms. Receipts from crops, on livestock farms, were unimportant. The proportion of total receipts composed of livestock products sold was higher in all cases on farms specializing in livestock production than for other farms in the same size group; however, the difference was only slight between diversified and livestock farms in the small and large farm size groups. The proportion of livestock receipts due to a livestock increase<sup>6</sup> averaged higher on medium and large diversified farms than on livestock farms in the same size group. This, combined with the receipts from livestock products sold, gave large diversified farms a greater proportion of receipts from livestock than large livestock farms.

#### Costs and Returns

Returns to the operator varied from an average of \$477 on small livestock farms to \$7,588 on large crop farms; however, there was no significant difference between the average return per operator on large crop farms and large diversified farms. The third highest average incomes were received by medium sized livestock farmers.

The quantity of productive services, as measured in dollars, required per unit of returns to the operator varied inversely with farm size; and, in all but medium sized farms, with livestock specialization.

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<sup>6</sup> Livestock increase includes livestock sold.

Table VIII. Costs and Returns, Distribution by Size (Annual Costs) and Livestock Specialization Groups, 1948

Size and Type of Farm <sup>1</sup>	Number of Farms	Total Costs <sup>2</sup>	Cash Costs and Depreciation	Interest on Real Estate	Interest on Other Capital	Charge for Unpaid Family Labor	Cash and Depreciation Costs	Interest on Real Estate	Interest on Other Capital	Charge for Unpaid Family Labor	Total Receipts	Returns to Operator
			Dollars			Percent of Total Costs			Dollars			
<b>Small:</b>												
Crop	2	1,762	1,323	211	121	107	75.06	12.00	6.87	6.07	3,101	1,339
Diversified	5	1,718	1,187	151	187	192	69.12	8.77	10.91	11.20	3,769	2,051
Livestock	3	1,291	921	132	122	117	71.34	10.19	9.42	9.03	1,768	477
All	10	1,599	1,135	157	154	153	70.97	9.82	9.66	9.54	3,035	1,429
<b>Medium:</b>												
Crop	2	3,237	2,181	458	335	263	67.38	14.15	10.36	8.11	5,415	2,179
Diversified	4	3,457	2,223	214	214	807	64.29	6.18	6.19	23.34	4,593	1,135
Livestock	4	4,308	3,506	349	307	136	81.38	8.10	7.12	3.16	10,127	5,829
All	10	3,750	2,728	317	275	430	72.75	8.45	7.34	11.46	6,971	3,221
<b>Large:</b>												
Crop	2	6,859	3,478	416	382	2,583	50.71	6.07	5.57	37.66	14,447	7,589
Diversified	2	10,231	8,564	648	716	303	83.70	6.33	7.00	2.97	17,517	7,286
Livestock	6	12,841	10,447	777	733	883	81.36	6.05	5.71	6.88	17,403	4,562
All	10	11,123	8,677	679	659	1,107	78.01	6.12	5.93	9.95	16,835	5,712

<sup>1</sup> Classifications are the same as in Table III.

<sup>2</sup> Charges for entrepreneurship and the operator's labor are excluded.

The estimate of operator income was arrived at by subtracting the sum of cash cost and depreciation, interest on the real estate investment, interest on other capital invested, and a charge for unpaid family labor from the total receipts. The rate charged for unpaid labor was \$1,214 for 312 ten hour days of labor; this figure was arrived at by averaging the wages paid to regular hired help on farms included in the survey. The charges for capital invested were four percent on real estate and four and one half percent on other capital invested.

It has been suggested that the charge for capital should be made at the actual rate earned by the capital during the year of the study. It has further been suggested that the charge for the investment can be made, at the actual rate of earnings, by the use of a multiple regression equation,<sup>7</sup> using as independent variables the various classes of capital and as the dependent variable the sum of returns to the operator and his capital; deviations from this equation would then be taken as a measure of returns to the operator for his labor and entrepreneurship. This approach is faulty in two respects, as follows:

1. The long run rate of earnings, not the current rate, causes capital to move in or out of agriculture. This

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<sup>7</sup> For one such suggestion, see Rex D. Helfinstine, Economic Analysis of Some Standard Farm Management Research Procedures, Master's thesis, Iowa State College, 1947, pp. 72-74.

long run rate of earnings is certainly influenced by the current rate but is reflected better in the market rate of interest.

2. The price of capital is determined by the marginal lender and marginal user of capital, not by the average. A multiple linear regression would attempt to eliminate the charge for capital at the rate of earnings of the average user of capital, not the marginal user, and would not always succeed in this as there is probably a curvilinear relationship between the returns to entrepreneurship and the quantity of capital used by the operator; thus entrepreneur earning would be confused with capital earnings. It would seem that the proper rate to charge would be one which reflects the long run interest rate for such investments as nearly as it can be determined.

## CHAPTER IV

### ANALYSIS OF FACTORS RELATED TO OPERATOR INCOME

Proceeding from description to analysis, it was found impractical to subdivide the already small grouping for further examination. Instead, the following approach was taken:

1. The 30 farms were divided into two main groups on the basis of the factor under scrutiny.
2. The individual farms in each of the two groups were then examined and an attempt was made to select relatively homogeneous sub-groups of farms from each of the main divisions for comparison.

This approach was only partly successful. The three main factors examined--production rates, labor efficiencies, and an index of prices received were so closely associated with each other and with the size of business that the influence of one, isolated from the others, could not be definitely determined. Although precise relationships could not be established it is believed that these analyses further increase the knowledge about milk producing farms in the area.

#### Rate of Total Production

The hypothesis is often made that above average crop yields and livestock production rates can be obtained without adding as much to the farmer's costs as they add to his total revenue. This is not necessarily true in individual cases, but farmers as a group do attempt to look into the future to estimate prices and productions, and as a group, they usually stop short of the point where increased yields add more to costs than to total revenue. The objective of determining the

Table IX. Rate of Total Production, Relation to Operator Income and Other Factors

Type of Farm <sup>1</sup>	: Farms :	: Total Annual Costs :	: Total Man Work Units :	: Pounds of Milk Per Cow Milked :	: Cotton:	: Other Crops:	: Pasture:	: Soils:	: Value Per Unit of Product:	: Labor <sup>2</sup> Efficiency:	: Average Production Rates:	: Operator Income:				
													: Numbers:	: Dollars:	: Units:	: Number:
<b>Cotton-Dairy Farms:</b>																
Production rate above 94 percent:																
18 acres of cotton or more	4	7,811	601	11.6	4,797	55.8	107.	4.9	63.8	3.2	4	0	98.0	0.88	131	6,822
Less than 18 acres of cotton	4	4,109	247	8.0	5,161	11.0	49.	3.5	55.3	4.4	4	0	94.5	0.65	104	1,734
Production rate below 95 percent:																
15 acres of cotton or more	4	4,214	373	8.4	3,968	29.3	68.2	3.6	62.0	3.5	4	0	95.3	0.98	72	1,692
Less than 15 acres of cotton	4	2,680	200	5.7	6,940	8.9	22.1	1.5	78.0	6.2	0	4	88.5	0.60	77	1,474
<b>Dairy Farms:</b>																
Production rate above 94 percent:																
31.5 milk cows or more	4	15,252	746	50.4	7,288	0	116.	1.5	229.0	3.1	4	0	97.0	1.25	120	8,275
Less than 31.5 milk cows	3	8,348	321	20.5	5,916	0	10.	0.4	201.0	7.2	3	0	98.0	0.86	114	3,440
Production rate below 95 percent:																
13.0 milk cows or more	3	9,128	390	26.7	4,297	0	39.3	1.0	126.0	3.2	2	1	100.7	0.75	88	1,688
Less than 13.0 milk cows	3	3,262	188	8.7	2,870	0	15.7	1.0	108.0	7.6	0	3	84.7	0.47	56	842
<b>Average of All Farms:</b>																
Production rate above 94 percent:	15	8,931	489	22.5	5,782	17.8	74.5	2.1	733.1	3.9	15	0	96.8	0.91	118	5,176
Cotton-Dairy Farms	8	5,989	424	9.8	4,980	33.4	78.0	4.4	59.5	3.7	8	0	96.3	0.77	118	4,278
Dairy Farms	7	12,293	564	37.6	6,861	0	70.0	1.3	217.1	4.0	7	0	97.5	1.08	117	6,203
Production rate below 95 percent:	14	4,625	288	11.6	4,652	10.9	37.6	1.8	90.2	4.5	6	8	92.2	0.71	73	1,447
Cotton-Dairy Farms	8	3,447	287	7.1	5,454	19.1	45.1	2.7	70.0	4.6	4	4	91.9	0.79	74	1,583
Dairy Farms	6	6,195	289	17.7	3,583	0	27.5	1.0	117.2	4.4	2	4	92.7	0.61	72	1,265

<sup>1</sup> The term "Cotton-Dairy" applies to farms producing cotton and milk; "Dairy" applies to farms producing no cotton.

<sup>2</sup> Labor efficiency was measured in man work units per 10 hours of available labor.

existence of a relationship between production rates and income, if one exist, is to point out to farmers that some are receiving greater incomes due to higher production rates. Using a budget method the individual farmer can then consider the possibility of the same relationship existing for his business.

When the farms were arrayed according to the rate of total production,<sup>1</sup> divided into two groups, and the individual farms examined in each group it was noted that two sub-groups had higher incomes than the others. These were farms with large cotton acreages and farms with a large number of dairy cows. Further it was noted that the farms with the most dairy cows had no cotton and that the farms with much cotton had relatively few dairy cows. An analysis of cotton and non-cotton farms is presented in Tables IX and X.

Table IX shows that the average of operator incomes increased from \$1,447 to \$5,175 when the total production rate increased from 75 to 118 percent of average. The increase in income associated with the increased production rate was greater on non-cotton farms, which will be called "dairy farms" henceforth, than on cotton-dairy farms. On dairy farms average operator income increased from \$1,265 to \$6,203 as the production rate increased from 72 to 117 percent of average, while on

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<sup>1</sup> The rate of total production was computed by dividing the total productive man-work units into total adjusted productive man-work units. Adjusted man-work units are computed by dividing the average number of work units, required in the area, per head of livestock or per acre of crop into the average production per head or per acre. The result is the average number of work units per unit of product. This multiplied by the total number of units of the product produced equals the total adjusted man-work units for the enterprise.

cotton-dairy farms the average increase was only from \$1,583 to \$4,278 for a comparable increase in production rate. These increases in total production rates were also accompanied by increases in the average farm size; this was more pronounced in dairy farms than on cotton-dairy farms.

On cotton-dairy farms operator incomes were not greatly affected by increases in size, as measured by total annual cost, nor by increases in production rates, nor both, until the average annual costs exceeded \$4,000 and production rates were above 104 percent of average. However, the group having 18 or more acres of cotton per farm and production rates above 94 percent of average, showed a substantial increase in income over all other groups of cotton-dairy farms, their incomes averaging \$6,822 per farm, as compared to \$1,474 to \$1,734 for the other groups.

Small dairy (or non-cotton) farms with low production rates had lower incomes than other groups of farms. As there were no other dairy farms of approximately the same size the influence of high production rate on the incomes of small dairy farms could not be ascertained. However, a comparison of the low-producing farms having 13 or more cows with the higher-producing group having less than 31.5 cows per farm, indicated an increase in operator income from \$1,688 to \$3,440 associated with an increase from 88 to 114 in the production index, despite the fact that the farms in the latter group were smaller in terms of annual costs, productive man-work units, number of cows, and acres of crops. The increased income was the result of better production rates, more adequate pasture, and higher labor efficiency.



The most valid comparison between cotton-dairy and dairy farms was that of the larger dairy farms having lower-than-average production rates with the larger of the low-producing cotton-dairy farms. This indicated, rather definitely, that when production rates were below average the cotton-dairy farms paid as well as, if not better than the dairy farms even though the latter were larger and had slightly higher production rates. The groups in which dairy farming appeared more profitable than cotton-dairy farming were not strictly comparable in size or labor efficiency.

The farms designated as "cotton-dairy farms" in this analysis includes only those milking five or more cows at the beginning of the year. No comparison is available between non-milking specialized cotton farms and non-cotton specialized dairy farms and no conclusion is warranted as to their relative profitableness in the year of the study. However, the larger dairy farms having better-than-average production rates made higher incomes than did the larger cotton-dairy farms whose production rates were also above average. The dairy farms having 31.5 or more cows and a production index above 94 averaged \$8,275 operator income per farm as compared with \$6,822 for the farms having 18 or more acres of cotton and production rates above 94 percent. This group of dairy farms had the advantages of larger size of business and higher labor efficiency, which contributed to the higher incomes. Although their average milk production per cow was 7,288 pounds as compared with only 4,797 for the cotton-dairy farms, the overall production rates of crops and animals combined were somewhat below those of the

cotton producing farms, though both groups were above the average of all farms. Apparently it was only the relatively large dairy farms with high production rates that were significantly more profitable than the cotton-dairy farms in this area in the year of the study. Farmers contemplating specializing in the dairy business in this area should consider carefully the increased capital requirements and the skill and technical knowledge necessary for building up and operating a relatively large herd of cows at better-than-average production rates and economical costs.

#### Labor Efficiency

The farms were divided into two groups on the basis of having labor efficiency indices greater or less than 0.74<sup>2</sup> and then sub-divided into cotton-dairy and dairy farm groups. The results obtained from this analysis follow.

When labor efficiencies were above 0.74 the average operator income per farm was \$4,843 compared with an average income of only \$1,933 where labor efficiencies were lower than 0.75.

Operator incomes and labor efficiency indices fluctuated more widely on dairy farms than they did on cotton-dairy farms. Not only was the range greater over which operator incomes on dairy farms fluctuated, but the average amount of change in incomes associated with a 0.1 average change in the labor efficiency index was greater for dairy farms than for cotton-dairy farms. This may have been due to the fact that increasing

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<sup>2</sup> Labor efficiency was measured by the number of productive man-work units accomplished per ten hours of available labor.

Table X. Labor Efficiency, Relation to Operator Income and Other Factors

Type of Farm <sup>1</sup>	Farms	Total Annual Costs	Total Man Work Units	Cows Milked	Pounds of Milk Per Cow	Acres of Cotton	Acres of Other Crops	Acres of Pasture	Acres Per Grazing Animal	Soils	Value Per Unit of Product	Rate of Total Production	Efficiency of Labor	Operator Income		
	Numbers	Dollars	Units	Number	Pounds	Acres	Acres	Unit	Acres	Unit	Number	Number	of Average	of average	Units	Dollars
Man work units per 10 hours of available labor above 0.72:																
Cotton-Dairy, more than 58 acres of cotton	3	7,016	725	10.3	4,345	78.0	110.3	5.7	81.7	4.3	3	0	97	101	1.26	5,793
Cotton-Dairy, less than 59 acres of cotton	3	3,794	325	7.3	5,919	11.	55.7	2.5	102.3	4.6	2	1	94	87	0.91	3,208
Dairy, more than 39 milk cows	4	15,388	745	52.5	6,343	0	123.0	1.6	198.5	2.6	4	0	100	115	1.18	8,241
Dairy, less than 40 milk cows	4	10,455	419	26.1	6,262	0	46.0	1.2	221.5	5.7	4	0	97	105	0.98	1,957
All Cotton-Dairy Farms	6	5,405	525	8.8	5,132	44.5	83.0	4.0	92.0	4.4	5	1	96	94	1.09	4,500
All Dairy Farms	8	12,921	582	39.3	6,302	0	62.0	1.1	210.0	3.6	8	0	99	110	1.08	5,100
All Farms	14	9,700	558	26.21	5,801	19.1	75.1	1.8	159.	3.8	13	1	97	102	1.08	4,843
Man work units per 10 hours of available labor below 0.74:																
Cotton-Dairy, more than 16 acres of cotton	4	5,926	339	11.0	4,456	22.8	78.0	4.0	39.0	2.0	4	0	94	115	0.66	3,691
Farms producing less than 18 acres of cotton, but more than 9	4	3,457	207	6.1	3,895	11.8	33.8	2.9	32.8	2.8	3	1	95	87	0.53	689
Dairy, milking 6.5 cows or more	4	4,118	213	11.5	4,771	1.4	21.0	0.9	112.0	5.2	1	3	94	83	0.56	2,282
Dairy, less than 6.5 cows	3	2,214	116	5.8	2,741	0	13.7	1.0	97.3	7.3	0	3	92	77	0.41	781
All Cotton-Dairy Farms	8	4,319	273	8.6	4,176	17.3	56.0	3.5	35.9	2.3	7	1	94	101	0.60	2,190
All Dairy Farms	7	3,302	171	9.1	3,901	2.0	17.9	1.0	115.7	6.4	1	6	93	80	0.50	1,639
All Farms	15	4,043	225	8.8	4,047	10.2	38.2	2.3	68.	4.1	8	7	93	92	0.55	1,933

<sup>1</sup> The term "Cotton-Dairy" applies to farms that produced cotton and milk; the term "Dairy" applies to those farms that produced no cotton, except for one farm included in the group of large dairy farms with low labor efficiencies. This was a relatively large dairy farm upon which 5.5 acres of cotton were produced.

<sup>2</sup> Labor efficiency was measured in man-work units per 10 hours of available labor.

labor efficiencies were directly associated with increasing production rates on dairy farms but not on cotton-dairy farms. Labor efficiencies were directly associated with total man-work units and total annual costs on both types of farms, but this relationship was not consistent between all groups of cotton-dairy farms.

The smaller cotton-dairy farms with low labor efficiencies had average incomes of \$689 as compared with \$3,208 for those with high labor efficiencies. These two groups were comparable as to production rates, total annual costs, and acres of cotton. Among the larger cotton-dairy farms, those with high labor efficiencies had incomes appreciably above those with low labor efficiencies. Those with low labor efficiencies had higher average production rates, while those with high labor efficiencies had larger businesses. Within each of the labor-efficiency groups of cotton-dairy farms labor efficiencies, operator incomes, and farm sizes were directly associated.

On dairy farms labor efficiencies, farm sizes, production rates and operator incomes all increased consistently together, except for those dairy farms with high labor efficiencies milking less than 40 cows. This group had an average income of \$1,957 compared with \$2,282 for the group of dairy farms having low labor efficiencies and milking 6.5 cows or more. This is in spite of the fact that the farms with the higher labor efficiencies also had the advantages of larger businesses and higher production rates. The failure of this group to conform to the relationship (followed by other dairy farm groups)

may be connected with the fact that only one farm in the group had any crop land and the others were apparently using a larger proportion of unimproved pasture per cow, as indicated by the high ratio of pasture acres to the total number of grazing animal units. All of them were located on Cherokee Prairie Soils where grazing rates are relatively high.

All groups of cotton-dairy farms were more profitable than the most comparable respective group of dairy farms, except in the high labor efficiency division when the group of larger dairy farms was compared with the group of larger cotton-dairy farms. In the low labor efficiency division this was to be expected because cotton-dairy farms had the advantage of higher labor efficiencies, higher production rates, and greater farm size. In the high labor efficiency group the smaller dairy farms had the advantage of higher labor efficiencies and production rates and larger farm sizes, compared with the smaller cotton-dairy farms but had an average income of only \$1,957 compared with \$3,208 for the cotton-dairy farms. This is the group of dairy farms that had lower average incomes than the next most comparable group of dairy farms, over which it also had the same advantages. The group of larger dairy farms having high labor efficiencies were the most profitable of any group of farms included in the study. These farms were not strictly comparable with other groups, however; their average annual costs were more than double those of the large cotton-dairy farms which had higher labor efficiencies but

lower production rates.

The above analysis warrants a statement similar to that made when discussing production rates, viz., that only relatively large specialized dairy farms with high labor efficiencies were significantly more profitable than the cotton-dairy farms included in the study during the year 1948. It is again pointed out that farmers in specialized dairy production in this area had to have more capital (plus additional skill and technical knowledge of dairying) if they were to have a dairy business capable of giving them equal or higher incomes than cotton-dairy farmers had.

#### Value per Unit of Product

As has been formerly stated it was found that variations in an index of the value per unit of the production<sup>3</sup> was associated with variations in production rates, labor efficiencies, and operator incomes. This was not nearly so strong an influence as were production rates and labor efficiencies. Either because other factors were so variable or because the relationship of this index to operator income was inconsistent its influence could not be determined when farms were divided into more than two groups. The following table shows this average association.

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<sup>3</sup> This index is the farmer's actual gross receipts divided by what they would have been had he received average prices for all of his products.

TABLE XI. Value per Unit of Product Index, Related to Operator Income and Other Factors

Type of Farm	Val. per Unit of Product Index	Total Annual Costs Dollars	Total Man-work Units	Rate of Total Production % of Ave.
Val. of Product Index Above 95%	103	8,132	476	98.0
Val. of Product Index Below 96%	86	4,964	302	92.0

Man-work units per 10 hours of Available Labor	Operator Income Dollars
0.86	4,141
0.72	1,958

Type of Milk Sold

Table XII gives a comparison of farms selling whole milk with those selling cream. Non-cotton-dairy farms selling whole milk had the highest average incomes of any group in the analysis. Every farm in this group was larger, as measured by total annual cost, and milked more cows than any farm included in the study that sold cream. This group also averaged higher labor efficiencies, and value per unit of product indices than any other group and was second highest in production rates.

Non-cotton-dairy farms selling cream had the lowest average income of any group; they also had the lowest production rates, labor efficiencies, and value per unit of product indices. Although their annual costs were greater than those on cotton-dairy farms with less than 18 acres of

Table XII. A Comparison of Farms Selling Whole Milk with Farms Selling Cream

Type of Farm and Product Sold	Farms Number	Total annual costs Dollars	Total Man Work Units	Dairy Cows Pounds Milk Per Cow	Cotton Acres	Other Crops Acres	Pasture Acres	Production Rate Percent of Average	Labor <sup>1</sup> Efficiency Man Work Units	Value Per Unit of Product Index	Operator Income Dollars	
Dairy (non-cotton):												
Selling whole milk	8	12,194	550	37	6,110	0	68	196	110	1.04	99	5,328
Selling cream	5	3,238	187	10	3,268	0	16	174	67	0.44	86	450
Cotton-Dairy:												
Selling whole milk	4	6,076	302	12	7,120	13	67	72	125	0.73	96	4,048
Selling cream:												
18 acres of cotton or more	5	5,733	543	8	3,516	54	104	64	102	1.02	93	4,378
Less than 18 acres of cotton	6	2,923	232	5	5,745	12	29	67	77	0.64	94	1,418

<sup>1</sup> Labor efficiency was measured in man-work units per 10 hours of available labor.



cotton, only one farm in the group had more than 200 total man-work units.

When the cotton-dairy farms were divided into whole milk and cream selling groups, the average income on cotton-dairy farms selling cream was lower than on cotton-dairy farms selling whole milk. Examination of the individual farms showed the group of cotton-dairy farms selling cream to be composed of farms differing greatly in size; therefore they were sub-divided on the basis of whether they produced more or less than 18 acres of cotton. From this division it was determined that cotton-dairy farms producing more than 18 acres of cotton were as profitable as those selling whole milk. It is interesting to note, that when cotton-dairy farms selling cream and producing less than 18 acres of cotton are compared with the other two groups of cotton-dairy farms, that the addition of seven cows and one acre of cotton, combined with a change from cream to whole milk, added approximately as much to the income as did the addition of 42 acres of cotton and three cows in the business of selling cream.

#### Quality of Business

In order to demonstrate the combined effects of the three factors--production rates, labor efficiencies, and prices received--they were combined into a quality of business index. This is a rather crude index. All three factors were given equal weights and the degree of divergence above or below the average was not considered. The method of classification as to farm business quality is presented

in the table below.

TABLE XIII. Quality of Farm Business, Classification Method.

Labor Efficiencies:	Production Rates	Value per Unit of Product Index	Quality of Farm
Above 0.72	Above 94	Above 95	Good
		Below 96	Fair
	Below 95	Above 95	Fair
		Below 96	Poor
Below 0.74	Above 94	Above 95	Fair
		Below 96	Poor
	Below 95	Above 95	Poor
		Below 96	Very Poor

TABLE XIV. Quality of Farm Associated with Operator Income and Other Factors

Farm Quality and Type	Farms : Number	Annual Costs : Dollars	Total Man-Work Units : Units	Cows : Number	Cotton : Acres	Operator Income : Dollars
<b>Good:</b>						
Dairy	2	17,894	883	56	0	7,492
Cotton-Dairy	3	7,109	663	11	60	4,347
All	5	11,423	751	29	36	5,605
<b>Fair:</b>						
Dairy	6	10,477	480	32	0	5,496
Cotton-Dairy	5	6,375	465	11	40	3,951
All	11	8,612	473	23	18	4,793
<b>Poor:</b>						
Dairy	1	3,024	170	9	0	-391
Cotton-Dairy	6	3,402	247	5	14	1,777
All	7	3,348	236	6	12	1,467
<b>Very Poor:</b>						
Dairy	3	3,508	130	9	0	239
Cotton-Dairy	3	2,726	241	10	13	1,220
All	6	3,117	186	9	7	729

The results of this analysis are presented in Table XIV and Figure III. Dairy farms with high quality of business were much larger and had higher incomes than cotton-dairy farm businesses of high quality. When the farm business quality was low the dairy farms were less profitable than the cotton-dairy farms

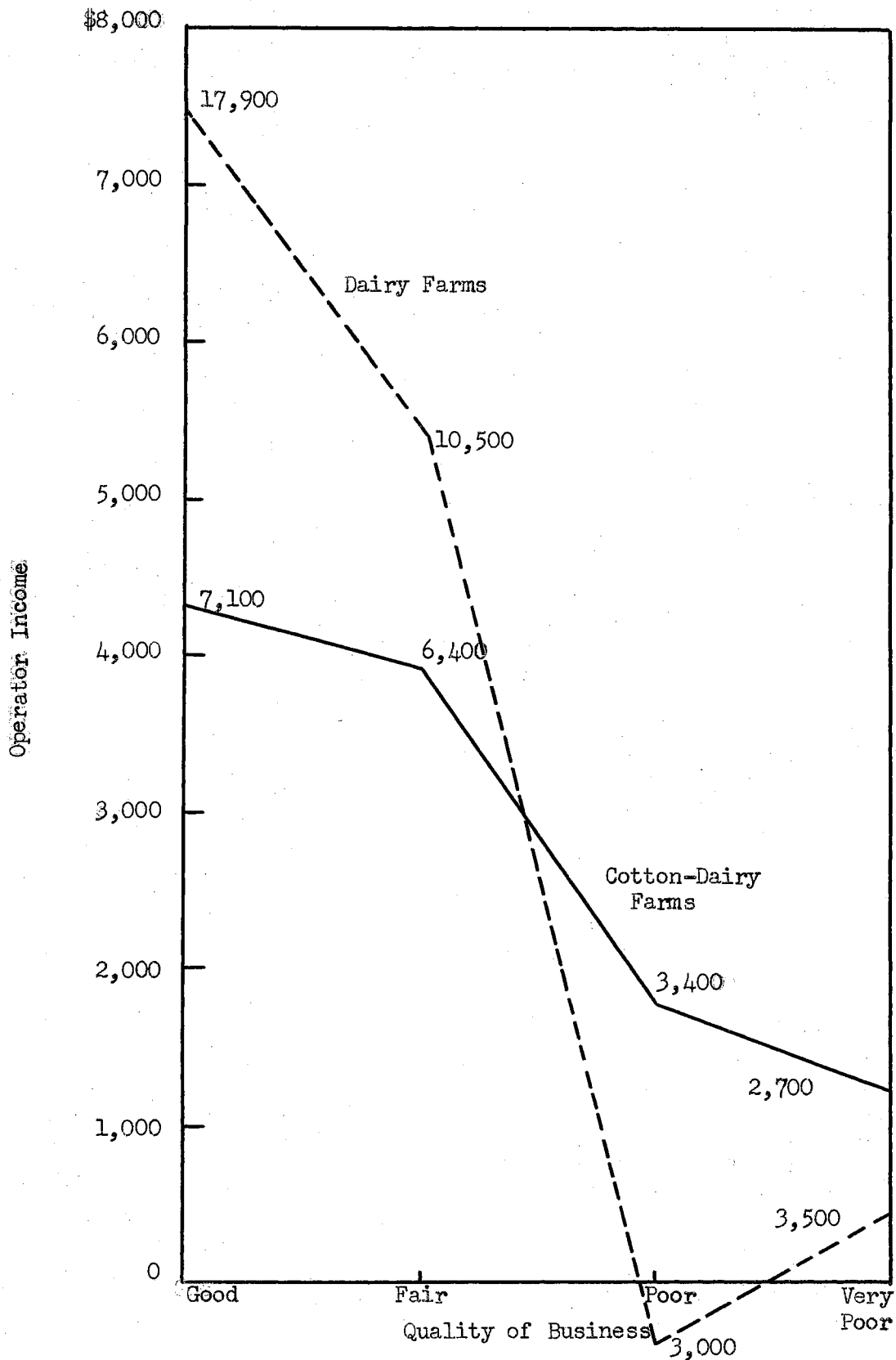


Figure III Quality of Farm Business Associated With Operator Income and Size of Business (Farm Size was measured by annual costs and is indicated by the Numbers Accompanying the Plotted Points.)

even though they were larger in terms of annual costs.<sup>4</sup>

### Tenancy

For the purpose of this analysis those farms on which the operator owned all of the capital invested were compared with those on which the operator owned all of the capital except the real estate. Others were excluded because it was not possible to determine what proportion of the capital was the operator's. An attempt was made to compare groups of owners with groups of tenants who owned approximately the same quantity of capital. Table XV shows that renters who owned from \$1,563 to \$3,481 operated farm businesses in which the total capital invested was \$6,692 as compared to \$7,242 for owners who had from \$4,579 to \$11,823. All four of the renters were cotton producers while only four out of eight of the owners grew cotton. These renter operated farms had higher production rates, value per unit of production indices, and incomes than did the owner operated farms. When owners having from \$4,579 to \$11,823 of capital are compared with renters having from \$5,549 to \$11,334 the renters had an average income of \$4,889 compared to \$928 for owners. This higher income was associated with larger businesses which had higher labor efficiencies, production rates, and value per unit of product indices. For some unexplained reason, operators who owned their farms did not have incomes approximately equal to those made by renters until they had sufficient capital to obtain businesses that were much larger than those operated by renters.

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<sup>4</sup> It is pointed out that there was only one dairy farm that classified as poor; therefore, it was not considered significant for comparison.

Table XV. A Comparison of Owner with Tenant Operated Farms

Type of farm and operator capital <sup>1</sup>	Farms	Total man work	Total annual costs	Total capital	Farms producing cotton	Total production rate	Labor Efficiency	Value per unit of product	Operator income
	Number	units	Dollars	Dollars	Number	average	units	Index	
<b>Owner operated:</b>									
\$ 4,579-\$11,823	8	181	3,073	7,242	4	80	0.53	0.88	928
12,462- 22,613	4	318	7,557	18,056	1	115	0.89	0.98	3,704
23,405- 44,928	4	590	13,365	36,305	0	103	0.99	1.02	4,614
<b>Tenant operated:</b>									
\$1,563-\$ 3,481	4	229	3,265	6,692	4	89	0.55	0.90	1,391
5,549- 11,334	6	351	5,454	16,536	4	96	1.06	1.08	4,889

<sup>1</sup> The term "Operator Capital" means all capital in the case of owner operators and all capital not real estate in the case of operators who rented the real estate.

<sup>2</sup> Labor efficiency was measured in man-work units per 10 hours of available labor.

## Economic Conditions in 1948

This was a period favorable to agricultural producers. The years just preceeding had had a rapidly rising general price level and as usual under such conditions the prices of farm commodities had risen higher relatively than had the costs of farming. This is indicated by an index of 293 for prices received by farmers in Oklahoma compared with index of only 255 for prices paid by farmers for production goods in the United States.<sup>5</sup>

Cotton prices had risen more than milk prices, relative to the 1910 to 1914 base period. The index of cotton lint prices received by Oklahoma farmers was 268 compared with an index of only 245 for milk prices.

It was difficult to determine which group of farms, included in the study, was in a more favorable position as to costs. The degree of importance of different types of production services, for which price index numbers are available, was not known. However, costs must be considered. It is thought that the prices charged farms included in the study for the use of production goods not readily variable approach long-run "normal" prices. That is, for instance, the charge for interest on the investment in and depreciation on equipment was made, as nearly as possible, at the price paid for the equipment by the farmer when he bought it new. This should partially eliminate the necessity of examining prices other than those for the readily variable services.

Feed, one of the dairyman's major costs, had a price

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<sup>5</sup> The base period for the index was 1910 to 1914.

index of 265. Supplies, important to both cotton and dairy farmers, but probably more so to the dairyman, had a price index of only 185. Farm wages, which are more important to the cotton farmer because of his low ratio of capital to labor, were high throughout the United States. In 1948, the United States price index of farm wages was 428. In Oklahoma the price index of cotton picking rates was 440.<sup>6</sup> Seed was relatively high-priced, at an index of 348, while fertilizers were relatively cheap with a price index of 152.

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<sup>6</sup> This index was not a continuous series since 1910 to 1914. It was first computed on a 1935 to 1939 base and then adjusted to the 1910 to 1914 level of farm wage rates.

## SUMMARY

This is an investigation of Milk producers in the Arkansas River Valley Area (Type of Farming Area Nine) of East Central Oklahoma. With the requirement that they had five or more milk cows at the beginning of 1948, records of the organizations and activities of thirty farms were selected from a larger study which was being carried on, in cooperation, by the Oklahoma Agricultural Experiment Station and the Bureau of Agricultural Economics of the United States Department of Agriculture. These records serve as the basis for this study.

The unique manner by which this area was settled was conducive to small farms, a dense rural population, and low farm incomes. At least since 1939, the area has been in a trend to a more extensive type of agriculture in which cotton has become less important and the production of livestock more important. Also the ratio of total number of acres in pasture to the total number of grazing animal units has increased, while the ratio of the total number of acres planted in feed crops to the total number of all animal units has decreased.

For descriptive purposes the 30 farms were divided into small, medium, and large farms on the basis of annual costs. These groups were further divided into crop, diversified, and livestock farms according to the percent of man-work units devoted to livestock.

The total amount of capital invested in the farm business varied among individual farms from \$4,114 to \$60,613 per farm; the extremes occurred on farms that specialized in livestock production. The percentage of total capital invested in real



estate was highest among the crop farms and lowest among the diversified farms. This factor was inversely related to variations in the size of the business. The percentage of total capital invested in machinery and equipment increased with an increase in the size of crop farm businesses, but the relationship was reversed with an increase in the degree of specialization in livestock. The percentage of capital invested in livestock increased among these farms with increased livestock specialization and reduced size of business, except on large-sized diversified and crop farms having relatively large herds of non-dairy cattle of relatively high value per head.

Although size of business was measured by total annual costs, increased acreages were generally associated with increased size of business, particularly among the crop farms. Within each size group, increased livestock specialization was associated with reduced crop acreages, especially of cash crops, and with increased pasture acreages per farm. It was also associated with declines in the proportions of productive land used for crops, which were much more marked for cash crops than for feed crops, but the rate of decline in the proportion for cash crops increased and that for feed crops decreased with an increase in the size of the farm business. The proportion devoted to feed crops among livestock farms increased with an increase in size of business, with a slight decrease in the proportion devoted to pasture. Cash crops were non-existent on specialized livestock farms.

Corn occupied more crop land than any other crop, and

combined with cotton, prairie hay, and oats it occupied 81.3 percent of the total cropland.

With the exception of a few large beef breeding farms, increased livestock specialization was equivalent to an increased proportion of dairying. Among the crop and diversified farms the livestock that was kept tended toward grain-consuming rather than roughage-consuming animal units.

The proportioning of receipts between crop and livestock sources was consistent with the relative degree of crop or livestock specialization. However, with increased livestock specialization an increase was found in the proportion of livestock receipts represented by products rather than animals, owing to the increased emphasis on dairying rather than beef or hog production.

Increased size and specialization of the livestock business were accompanied by increased net returns to the operator and increased operator's return per dollar of annual cost. Averages in operator's returns varied from \$477 on small livestock farms to \$7,588 on large crop farms.

In general variations in production rates, labor efficiencies, and prices received per unit of product were directly associated with variations in the operators' incomes, the sizes of their businesses and with each other.

As compared with cotton producing farms, the association of labor efficiencies and production rates was more consistent on farms producing no cotton; this combined with a wider range in their farm sizes probably explained why the incomes on non-cotton farms were both the highest and lowest of any in the

sample.

Variations in prices received were not as consistently associated with variations in farm sizes, production rates, labor efficiencies, nor with the operators' incomes as were the four latter related to each other.

The three--production rates, labor efficiencies, and the value per unit of product indices--were combined into a "quality of farm business" index. Upon sorting the farms by this index, it was determined that the dairy farms which produced no cotton and were of good or fair quality had larger incomes than did cotton-dairy farms of comparable quality; they were also much larger than any other group of farms. When the index of farm business quality was poor or very-poor cotton-dairy farms, though smaller, were more profitable than non-cotton dairy farms.

The analyses of production rates, labor efficiencies, and prices received indicated that among non-cotton dairy farms only those that were relatively large and of high quality had incomes comparable to or above those received on other farms.

Non-cotton dairy farms selling whole milk had higher incomes than any other group of farms. They also had the largest farms, the highest labor efficiencies, and highest value per unit of product indices. The second highest incomes, which were approximately equal, were received by those cotton-dairy farms producing an average of 54 acres of cotton, milking eight low producing cows, and selling cream, and those producing an average of only 13 acres of cotton, milking 12 high producing cows, and selling whole milk. The

average annual costs of these two groups were approximately equal and only about 50 percent as large as the average for the large specialized dairy farms that sold whole milk. This indicated that small cotton-dairy farmers who sold cream could increase their incomes, approximately equal amounts, by either increasing their cotton acreages or by increasing the size and quality of the dairy enterprise and selling whole milk. A similar statement might be made about small non-cotton farmers who sold cream.

When operators owning approximately the same amount of capital were compared those who rented farms had larger farm businesses, as measured by total man-work units, annual costs, or total capital used. On these larger farms they had higher production rates and labor efficiencies, received higher prices for their products, and had larger incomes. The higher incomes of the renters was not wholly attributable to the fact that they had larger businesses; owners did not receive comparable incomes until they had much larger farms than those operated by renters.

The shift from cotton to feed crops and pasture has been associated with increased dairy and beef production in this area. Great variation has occurred in the incomes received from the new type of farming. Apparently, if dairying is to be sufficiently profitable to persist in the area in competition with older alternatives being abandoned, it must be organized into a high-quality of business, obtained through the economies of relatively large size, the achievement of rates of production better than the average now prevailing in the area, and sale of product as fluid milk rather than as cream.

APPENDIX

Basic data computed for use in estimating those parts of the farm businesses not enumerated or for which enumerations were unintelligible.

TABLE I. Chickens, Averages per Chicken on Hand January 1, 1948.<sup>1</sup>

	: Chickens on:		: Purchased :				: Sold :					
	: Hand Jan. 1:	: Value:	: Chicks :		: Pullets :		: Hens :		: Broilers :		: Others :	
	: No. :	: Value :	: No. :	: Value :	: No. :	: Value :	: No. :	: Value :	: No. :	: Value :	: No. :	: Value :
Number of Farms	: 7 :	: 0 :	: 7 :	: 6 :	: 7 :	: 7 :	: 7 :	: 7 :	: 7 :	: 7 :	: 7 :	: 7 :
Total All Farms	: 1017 :	: 1283.96 :	: 815 :	: 144.90 :	: 150 :	: 135.00 :	: 451 :	: 529.16 :	: 110 :	: 198.50 :	: 4 :	: 2.00 :
Average per Chicken: on Hand Jan. 1	: 1 :	: 1.262 :	: 0.810 :	: 0.144 :	: 0.147 :	: 0.132 :	: 0.443 :	: 0.520 :	: 0.108 :	: 0.195 :	: 0.004 :	: 0.002 :

: Home Used Products :								: Feed Used :						
: Eggs :		: Hens :		: Broilers :		: Others :		: Eggs :		: Laying Mash :		: Scratch Gr.:		: Corn :
: Doz. :	: Value :	: No. :	: Value :	: No. :	: Value :	: No. :	: Value :	: No. :	: Value :	: lbs. :	: Value :	: lbs. :	: Value :	: lbs. :
: 7 :	: 6 :	: 7 :	: 0 :	: 7 :	: 0 :	: 7 :	: 0 :	: 7 :	: 0 :	: 7 :	: 4 :	: 7 :	: 7 :	: 7 :
: 11,715 :	: 6,099.70 :	: 18 :	: 26.22 :	: 241 :	: 0.00 :	: 484 :	: 36 :	: 1 :	: 2.08 :	: 614 :	: 307.26 :	: 49,570 :	: 2,606.77 :	: 1620 :
: 11,519 :	: 6.001 :	: 0.018 :	: 0.026 :	: 0.247 :	: 0.496 :	: 0.001 :	: 0.002 :	: 0.604 :	: 0.302 :	: 48.742 :	: 2.583 :	: 1.593 :	: 0.061 :	: 35.092 :

: Misc.:							: Chickens on Hand :	
: Oats :		: Other Grain :		: Chick Mash:		: Cash :	: Dec. 31, 1948 :	
: lbs. :	: lbs. :	: Value :	: lbs. :	: Value :	: Exp. :	: No. :	: Value :	
: 7 :	: 7 :	: 7 :	: 7 :	: 7 :	: 7 :	: 7 :	: 0 :	
: 21,450 :	: 4,600 :	: 119.38 :	: 1,320 :	: 57.54 :	: 71.50 :	: 914 :	: 1,177.54 :	
: 21,091 :	: 4,524 :	: 0.118 :	: 0.865 :	: 0.070 :	: 0.070 :	: 0.899 :	: 1.149 :	

<sup>1</sup> Beginning and ending values, and the values of chickens and eggs used at home were estimated from prices received for chickens and eggs sold. In cases where the number of farms reporting values were fewer than the farms reporting numbers, average prices were used to estimate the values.

TABLE II. Hogs, Averages per Sow on Hand, January 1, 1948

	Sows on Hand:		Sows ending or:		PIGS		Hogs Bought		Hogs Not Bought:	
	Jan. 1, 1948:		Sales Weight		Farrowed: End or Sales:		Beginning:		Beginning:	
	No.	lbs.	lbs.	No.	lbs.	No.	lbs.	No.	lbs.	
Number of Farms Reporting:	9	9	9	9	9	9	9	9	9	9
Total of Farms Reporting:	23	4,925	5,755	1.95	13,092	17	243	23	1705	
Average per Sow on Hand	1	214.13	250.21	8.48	539.2	0.754	10.57	1	74.13	
Jan. 1, 1948										

Hogs Bought or Not :		Feed Used							Skim	Misc.
: End or Sales :		Corn	Shorts	Oats	Wheat	Mixed	CSM	Tankage	Milk	Cash
No.	lbs.	Bu.	100 lbs.	Bu.	Bu.	lbs.	lbs.	lbs.	100 lbs.	Exp.
9	9	9	9	9	9	9	9	9	9	9
40	5,600	686	113.8	60	70	1,000	1,400	2,345	834.6	87.00
1.734	246.08	29.85	4.95	2.61	3.04	43.48	60.87	101.96	36.3	3.78

TABLE III. Workstock, Averages per Head

	Work Animals:			Total	Total Depreciation	Misc.	Hay	Grain
	No.	Value <sup>1</sup>	Value <sup>1</sup>					
Number of Farms Reporting:	15	9	15		9	15	15	15
Total of Farms Reporting:	36	3,051	895.48	3946.48	349.48	66	27.5	255.9
Average per Work Animal	1	84.75	24.87	109.62	9.71	1.83	10.76	7.11

<sup>1</sup> Unenumerated parts of workstock schedules were estimated with averages computed from the other schedules used.

TABLE IV. Tractors, Averages per Year and per Acre Cultivated.

	Original Cost <sup>1</sup>	Length of Life	Annual Val. Loss	Years already Used	Value Dec. 1948	Tax 1948	Repairs 1948
	Dollars	Years	Dollars	Years	Dollars	Dollars	Dollars
Number Tractors Reported		17		17		5	14
Total for all Tractors	20,398	261	1,449.70	137.5	10,114.92		
Average for all Tractors	1,199.88	15.35	85.28	8.9	595.00	10.40	53.36
Average per Cultivated Acre			0.80				0.49

Tire Cost 1948	Cultivated Acres
Dollars	
14	17
	1,819
35.58	107
0.33	1

<sup>1</sup> Stillwater, Oklahoma machinery dealers made estimates as to the original cost of these tractors.

TABLE V. Trucks, Averages per Year and per Mile.

	Original Cost	Length of Life	Annual Depreciation	Already Used	Value End 1948	License Costs	Truck Repair 1948	Tires Used
	Dollars	Years	Dollars	Years	Dollars	Dollars	Dollars	Dollars
Number Trucks Reported	12	12		12		12	12	12
Total for all Trucks	11,535	169	961.33 <sub>1</sub>	60	8,215.68	86.50	108.50	686.65
Average per Truck	961.25	14.08	80 <sup>1</sup>	5	684.47	7.21	108.50	76.29
Average per Mile			0.0097					

Gas 1948	Oil 1948	Miles 1948
Gal.	Gts.	
12	12	12
75.80	711.94	98,621
615	59.33	8,218
		1

Total truck repair, tire repair, tires used, value of gas used, and value of oil used equal 108.5 / 14.32 / 76.29 / (615 x 0.1575) / (59.33 x 0.3025) divided by 8,218.42 or \$0.0383 per mile.<sup>1</sup>

	Jan. 1	Dec. 31	Annual Val.	Miles in	Gas in	Oil in	Value of	Repairs	License
	Value	Value	Loss	1948	1948	1948	Tires Used	in 1948	1948
Number of Automobiles Reported	5				5	5	4	4	5
Total for Automobiles Reported	927	746	181	30,000	1,841	139	105	108	53
Average per Automobile	509	249	60	6,000	368	27.8	26.25	26.47	10.60
Average per 100 Miles			1.06	.01	6.0	0.46	0.48	0.49	

TABLE VII. Farm Real Estate, Averages per Year

	Value	Value	Sq. Feet of	Val. per Sq.	Taxes per	Building	Repairs per
	of	of	Floor Space	Foot of	Taxes	\$100	Repairs
	Land	Buildings	in Buildings	Floor Space	Real Estate		Floor Space
	Dollars	Dollars	Square Feet	Dollars	Dollars	Dollars	Dollars
Number of Farms	22	22	22		5		18
Total	84,377	116,919	55,296		88		1,831
Averages				1.61		0.245	0.042

Annual	Depreciation per
Depre-	Sq. Foot of
ciation	Floor Space
Dollars	Dollars
19	
2,961	
	6.791



TABLE VIII. Materials Used per Acre in Producing Selected Crops.

Crop	Number of Farms	Item						Seed	Calcium Arsenate	Sacks	Binder
		Fertilizer 4-12-4	Fertilizer 5-10-5	Phosphate 20%	Phosphate 43%	Lime-stone	Sodium Nitrate				
		Pounds	Pounds	Pounds	Pounds	Tons	Pounds	Pounds	Pounds	Number	Cents
Corn	48	69.64	3.25	1.43	0	0	0.79	4.10	0	0	0
Cotton	49	37.69	0	0.55	0	0	0	18.74	20	0.02	0
All Sorghums	14	0	0	0	0	0	0	19.40	0	0	11.4
Lespedeza	12	0	0	0	0	0	0	24.64	0	0	0
Oats	15	32.10	2.31	36.07	40.40	.030	0	83.9	0	0	27.5

TABLE IX. Number of Times Operations (or the Equivalent) Were Performed While Producing Selected Crops.

Crop	Operations									
	Number of Farms	Breaking	Harrowing	Discing	Planting	Bedding	Cultivating	Cultivating	Binding	
							First	Later		
Corn	48	0.91	1.07	0.65	1.06	0.22	1.00	2.10	0	
Cotton	49	0.94	0.97	1.00	1.25	0.43	1	3.54	0	
All Sorghums	14	0.87	0.66	0.81	0.76	0	0.43	0.90	0.88 <sup>1</sup>	
Lespedeza	12	0.93	0.45	0.74	0.51	0	0	0	0	
Oats (Hay)	15	1.00	1.14	0.92	0	0	0	0	0	
Oats (Grain)		1.00	1.14	0.92	0	0	0	0	0.99	

Drilling	Mowing	Raking	Baling	Threshing
0	0	0	0	0
0	0	0	0	0
0.08	0.30	0.08	0.08	0
0.41	0.53	0.35	0.41	0
1.00	1.00	1.00	1.00	0
0	0	0	0	0.74

<sup>1</sup> 0.52 with corn binder.

TABLE X. Prices Paid by Farmers, Averages of Prices Reported for 1948

<u>ITEM</u>	<u>UNIT</u>	<u>PRICE</u>
Alfalfa Hay	ton	\$27.95
Alfalfa and Molasses Feed	100 lbs.	3.75
Alfalfa Seed	100 lbs.	30.00
Bedding (Straw)	bale	0.45
Binder Twine	lb.	0.25
Bran	100 lbs.	3.52
Calcium Carbonate	100 lbs.	0.75
Chops	100 lbs.	4.77
Clover Seed (Mixed)	lb.	0.30
Combining Grain	bu.	0.10
" "	acre	2.50
Corn Seed	bu.	8.29
Cotton Sacks	sack	2.30
Cotton Seed Meal	100 lbs.	4.63
Cotton Seed	bu.	3.09
Cow Pea Seed	lb.	0.24
Dairy Feed (Unspecified)	100 lbs.	4.00
Dairy Feed, 16%	100 lbs.	4.35
D. D. T.	gal.	5.30
Mixed Fertilizer, 4-12-4	100 lbs.	2.13
German Millet	100 lbs.	10.50
Grinding Feed	100 lbs.	0.20
Hauling Milk	100 lbs.	0.382
Ice	100 lbs.	0.50
Laying Mash	100 lbs.	4.71
Lespedeza Seed	100 lbs.	13.80
Limestone	ton	12.32
Meat Scraps	100 lbs.	6.25
Onion Seed	bu.	1.71
Oyster Shell	100 lbs.	1.50
Peanut Seed	100 lbs.	22.73
Phosphate, 20%	100 lbs.	2.54
Phosphate, 48%	100 lbs.	2.00
Prairie Hay	ton	18.33
Salt	100 lbs.	1.40
Shorts	100 lbs.	3.85
Sorghum Seed (Forage)	100 lbs.	8.10
Supplement, Mineral	100 lbs.	2.87
Strainer Pads	box	0.724
Sudan Seed (Sweet)	100 lbs.	16.00
Wheat Seed	bu.	2.10

TABLE XI. Prices Received and Values of Various Classes of Farm Animals, Averages of Values and Prices Reported for 1948.

<u>ITEM</u>	<u>UNIT</u>	<u>PRICE PER UNIT</u>
Whole Milk	Pound of Butter Fat	\$ 1.233
	100 Pounds of Milk	5.23
Cream	Pound of Butter Fat	0.693
Eggs	Dozen	0.521
Dairy Cow	Head	175
Dairy Heifer	Head	86
Beef	Head	
Beef	100 Pounds	
Hens (Laying)	Head	1.262
Hens (Meat)	Pound	0.257
Broilers	Head	1.805
Broilers	Pound	0.725
Chicks	100 Head	17.78
Workstock	Head	84.75
Hogs <sup>1</sup>	100 Pounds	23.61

<sup>1</sup> Bureau Agricultural Economics, United States Department of Agriculture, 1948.

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