SOME OF THE CAUSES OF DIFFERENCES IN INCOME AMONG FARMS PRODUCING MILK FOR MANUFACTURE IN NORTHEASTERN OKLAHOMA, 1950

by

JOHN RUSSELL KING

Bachelor of Science

Oklahoma Agricultural and Mechanical College

Stillwater, Oklahoma

1951

Submitted to the faculty of the Graduate School of
the Oklahoma Agricultural and Mechanical College
in partial fulfillment of the requirements
for the degree of
Master of Science
May 1955

SOME OF THE CAUSES OF DIFFERENCES IN INCOME AMONG FARMS PRODUCING MILK FOR MANUFACTURE IN NORTHEASTERN OKLAHOMA, 1950

Thesis Approved:

F. L. Underwood
Thesis Adviser

D. L. Fouts
Faculty Representative

Robert MacVicar
Dean of the Graduate School

ACKNOWLEDGEMENT

The writer wishes to express his deep appreciation for the assistance, patience, and wisdom of Dr. F. L. Underwood in the preparation and writing of this study. He also wishes to thank the other members of the Department of Agricultural Economics for their guidance.

TABLE OF CONTENTS

Chapter		Page
I.	INTRODUCTION	1
	Purpose, Method, and Scope of Study	1
	Economic Conditions	4
	Markets	5
	History	5
	Climate	6
	Topography	8
	Soils	8
	Uplands and terraces	9
	Alluvial soils	9
II.	DESCRIPTION OF THE FARMS STUDIED	11
	Land Use	11
	Crops	14
	Livestock	16
	Capital Investments	18
	Receipts	20
	Expenses	22
	Profits	25
III.	THE DAIRY ENTERPRISE	28
	The Herd	28
	Milk Production	30
	Milk Disposition	32
	Costs and Returns of Milk Production	34
	Labor costs	35
	Feed and pasture costs	37
	Milk hauling	38
	Building use	38
	Interest, insurance, and taxes	39
	Bull costs	40
	Other costs	41
	Milk sales	43
	Credits	43
	Profits	44

Chapter Page

IV. FACTORS AFFECTING THE TOTAL FARM INCOME AND MILK-PRODUCTION ECONOMY. 46

Size of Business. 47
Total acres in the farm. 47
Total productive-man-work units. 50
Comparison of acres and productive-man-work units as measures of size of business. . . 53
Size of herd in relation to total farm income 55
Size of herd in relation to milk costs and returns. 56
Total milk production. 59
Labor Efficiency. 60
Relation of work units per man to total farm income. 61
Total-farm milk output per man 62
Production Rates. 65
Milk production per cow in relation to total farm income. 65
Milk production per cow in relation to milk costs and returns 67
Relation of crop index to total farm income. 70
Total-farm production index. 72
Combination of Enterprises. 75
Proportion of the business represented by dairy 75
Relation of off-farm labor and machine use to total farm income 77

V. SUMMARY AND CONCLUSION 80

BIBLIOGRAPHY. 85
VITA. 86
TYPIST PAGE 87

LIST OF TABLES

Table		Page
1.	Monthly and Annual Temperatures and Precipitation at Miami, Oklahoma, 1950, with Departures from Average.	7
2.	Distribution of Farm Acreage.	12
3.	Relation of Total Acres in Farm to the Percentage of Land in Crops and Pasture.	13
4.	Frequency of Farm Sizes in Relation to the Rectangular Land Survey.	14
5.	Crop Acreages and Yields.	15
6.	Average Amount and Value of Livestock Kept.	17
7.	Summary of Average Capital Investment	19
8.	Distribution of Receipts.	21
9.	Distribution of Expenses.	23
10.	Summary of Total Farming Costs.	25
11.	Summary of Average Farm Profits	27
12.	Cattle Breeds Represented on 52 Dairy Farms of Northeastern Oklahoma, 1950.	28
13.	Variation in the Number of Cows per Farm.	29
14.	Variation in Annual Milk Production per Cow	32
15.	Milk Disposition, 52 Northeastern Oklahoma Manufacture-Milk Dairies, 1950.	33
16.	Variation in the Proportion of Total Milk Production Used on the Farm, 52 Northeast Oklahoma Manufacture-Milk Dairies, 1950.	34
17.	Summary of Costs and Returns of Milk Production, 52 Northeastern Oklahoma Dairy Farms, 1950	36
18.	Summary of Average Dairy Building Costs on 52 Manufacture-Milk Farms, 1950.	39
19.	Summary of Costs and Credits in Keeping Dairy Herd Bulls. . .	42

Table | Page

20. Relation of Total Acres in the Farm to Other Measures of Size of Farm Business 51

21. Relation of Total Acres in the Farm to Type of Business . . . 51

22. Relation of Total Acres in the Farm to Production Rates and Income. 51

23. Relation of Total Productive-Man-Work Units to Other Measures of Size of Farm Business 54

24. Relation of Total Productive-Man-Work Units to Type of Business. 54

25. Relation of Total Productive-Man-Work Units to Production Rates and Income. 54

26. Comparison of Relationships Shown by Grouping Farms by total Acres and by Total Productive-Man-Work Units. 55

27. Relation of Size of Herd to Total Farm Income 56

28. Relationship of Size of Dairy Herd to Costs and Returns in Producing Milk. 57

29. Relation of Total Milk Production to Other Measures of Size of Farm Business. 60

30. Relation of Total Milk Production per Farm to Rates of Production and Measures of Total Farm Income. 60

31. Relation of Labor Efficiency to Labor Income. 62

32. Relation of Amount of Milk Production per Man Equivalent to Various Total-Farm Factors. 64

33. Relation of Amount of Milk Production per Man Equivalent to Various Factors for the Dairy Enterprise. 64

34. Relation of Milk Production per Cow to Total Farm Income. . . 66

35. Relation of Milk Produced per Cow to Costs and Returns. . . . 68

36. Relationship of Pounds of Concentrates Fed per Cow to Milk Production, Costs, and Returns. 70

37. Relation of Crop Yields to Various Factors. 72

38. Relation of Production Index to Various Factors 74

Table Page

39. Relation of Percent of Total Receipts from Milk Sales to Farm Income 77

40. Relation of Percent of Work Units on Cows to Farm Income. . . 77

41. Relation of Off-Farm Labor and Machine Use to Total Farm Income. 79

42. Relation of Type of Farm to Off-Farm Labor and Machine Use. . 79

LIST OF FIGURES

Figures

1. Bi-Monthly Distribution of Total Milk Sales on 52 Northeastern Oklahoma Manufacture-Milk Dairies, 1950 . . . 31

CHAPTER I

INTRODUCTION

Many factors determine the income of an individual or the profit of a business. These factors are interrelated in many ways and those subject to change undergo great variation through the life span of the individual or the growth cycle of a business. Since the turn of the century technology has made great advances in agriculture. Changes resulting from new innovations or improved machinery have had their impact upon the physical make-up of today's farm and upon the mode of living of the farm family. Combined with technological changes are the biological laws, which are to a large extent unalterable. This fact places agriculture in a situation whereby the production process may not be circumvented completely nor even shortened beyond limits imposed by the laws of nature. Unable to alter a major ingredient of production - the biological - the farmer must attempt to balance his business so that it will return to him the thing he desires most, whether that be security and a haven in old age, or profit.

Purpose, Method, and Scope of Study

In response to numerous requests by farmers and other persons in advisory agricultural positions, for information on the relative costs and returns of milk production and incomes earned by farms producing milk, this study was undertaken in Northeastern Oklahoma for the year 1950. Farms that produced milk for manufacture purposes only and other farms that produced milk for fluid consumption were

found intermingled in the area. This thesis reports analyses of the data for the farms that produced milk for manufacture.

Farms included in the study were randomly drawn from a complete list of all farms selling milk to processing plants in the area. No form of selection was practiced except that the farms sold milk. A form letter was mailed to each operator whose name was drawn, to facilitate his comprehension of the nature of the survey and to assure him that the information would be kept confidential and would be used only for research purposes.

Data required for the study were obtained by the survey method. The schedule was carefully prepared and edited for unreasonable or misleading questions that might suggest an answer to the farmer or cause him to give an incorrect reply. A trained enumerator called on each farmer, usually by appointment, and completed the survey by asking the questions of the operator and recording the answers in his presence. Care was taken not to answer the question for the farmer but to secure the necessary information by asking the question in such a manner that the farmer could reply with information that was familiar to him. Not all items were estimated by the farmer, however. Many of the questions were completed by copying information from receipts, bills of lading, milk-check stubs, and other records kept by the farm family. The completed schedule was carefully audited in the field and another farm visitation made by the enumerator if there were apparent omissions or inconsistencies in the original data.

With the permission of the farmer, the processing plants allowed their records of prices paid, hauling charges, and total pounds of milk received from each operator to be scrutinized. This provided an accurate itemization of milk sales and items purchased through the

plants for all cooperators who had failed to accurately record their milk sales or to keep the milk-check stubs for the year.

The data obtained for each farm included a record of the uses of owned and rented land; crop production, sales, and inventories; all livestock inventories, purchases, sales, and deaths; sales of livestock products and income from miscellaneous sources; building and equipment inventories, purchases, sales, and repairs; all business operating expenses; land inventories; and detailed costs and returns in owning and operating the dairy. Dairy costs were segregated for bulls, young stock, and cows so that costs and returns in producing milk alone could be computed regardless of what practices were followed with respect to the provision of breeding services, the disposal of calves, or the provision of replacements. All items used by the dairy were included, whether provided by the farm or purchased. Thus, the growing of feeds was regarded as an enterprise separate from that of using the feeds to produce milk. The cows were also held responsible for paying for home grown labor on the same basis as for hired labor.

From the data assembled, the milk-production costs and profits, as well as various measures of total farm income, were computed for each farm. Auxiliary summaries included costs of providing pasture; rearing heifers; operating automobiles, trucks, and tractors; owning and using various buildings; and numerous other practices related to dairy profit and farm income. However, since one farm is hardly an adequate sample to represent the various complex relationships involved in successfully managing a farm business, the conclusions reported in this study were based on the behavior of groups of farms combined as to the commonness of specified characteristics. It was felt that principles were more reliably established by groups of farms in com-

parison than by the actions of a single outstanding farm.

Economic Conditions

The year 1950 was one of recovery from the slight recession generally experienced by most businesses in 1949. It marked the transition from an economy producing for a consumer's market to an economy producing for military preparedness.

The Korean War began June 25, 1950, and the nation's economy responded to the demand for large quantities of material and manpower employed by the government. The year 1950 was one of advancing costs to farmers and of advancing prices received for their products with isolated segments and producers not receiving this cost-price advantage.

The index of prices received by Oklahoma farmers for their production in 1950 attained the level of 272, while the index of prices paid by farmers was 261 (1910-1914 = 100). Thus, from the standpoint of prices paid and received by Oklahoma farmers, 1950 was regarded as a favorable year.

Rising prices caused the farmers in this survey to be optimistic. In general, they estimated that their livestock increased in value during the year. Wholesale prices received for milk by Oklahoma producers averaged $4.17 per 100 pounds, which would buy 115 pounds of the kind of dairy feed commonly purchased by dairymen. This was the same as the 1949 ratio, but 8 pounds above that for 1948 and 13 pounds more than in 1947. Prices received for hogs were favorable, with a hog-corn ratio of 14.2[1]. During the year egg prices averaged $0.32 per dozen, a reduction of $0.08 from the average for 1949. The cost of laying mash increased by $0.03 per 100 pounds to a yearly average

[1] Number of bushels of corn equivalent in value to 100 pounds of live hog at 1950 prices.

price of $4.36. Thus, egg production did not share the general price-cost advantage of other agricultural enterprises.

It was felt that the conclusions of this study were not invalidated by the 1949-1950 price-level changes, since these caused less variation in income among the farms in the area than did the differences in farm organization and management.

Markets

The surveyed farms were located near several manufacture-milk processing plants. These plants were located in Miami, Vinita, and Pryor, Oklahoma; Coffeyville and Chetopa, Kansas; Seneca and Neosho, Missouri; and Siloam Springs, Arkansas. The processing plants had established milksheds from which the milk was assembled and transported by truck to the plants. Only 9 farms hauled their own milk to market and only 5 of these hauled it the entire year. Of the 52 farms enumerated, 27 were located in Ottawa County, 19 in Craig County, 5 in Delaware County, and 1 in Nowata County.

History

The counties of Northeastern Oklahoma included in this study were deeply involved in Oklahoma history. The area came into the territory of the United States through the Louisiana Purchase in 1803. In that period the Verdigris and Neosho Rivers were a source of water for plant and animal life, and they constituted highways of travel. Because of the tendency of man to live near streams these two rivers and their neighboring flood plains became at a very early date the meeting place for trade between the native Osage Indians and the white traders. In 1825 the first permanent trading post in the State was established near Salina, Oklahoma, by Colonel August P. Chouteau. Colonel Chouteau

bartered with the Indians for their deer, mink, skunk, bear, and other skins and also for their oil extracts.

By the Treaty of 1828 the United States ceded to the Cherokee Indian Nation a patent to the entire Northeastern section of Oklahoma, which included all counties in this study. The land remained in the hands of the Cherokee Indians until the Territorial Oklahoma government was set in operation.

The United States, with the consent of the Cherokee Nation, settled ten displaced tribes in Ottawa county alone. The influence of the Indians and of settlers predominantly from the deep South left an imprint upon the historical development and population of Northeastern Oklahoma.

Climate

The climate of Northeastern Oklahoma is continental in nature and is therefore subject to wide seasonal variations. Rainfall has averaged 26 to 28 inches during the months April through October, (Table 1). The growing season averages 199 frost-free days. However, frost has occurred as late as May 8 and as early as September 29. Summer rains are usually violent thunderstorms of short duration, but winter rains are generally slow and extend through long periods during which the atmosphere is very moist. The winters are usually mild, and zero temperatures are uncommon, with blizzards infrequent and of short duration. Summer temperatures of 100°F. are common but usually occur only a few days each year. The area is susceptible to drought in July and August owing to deficient rainfall and a very high rate of evaporation. The drought period may be accompanied by hot southwest winds that are particularly injurious to growing corn. The

Table 1

Monthly and Annual Temperatures and Precipitation at Miami, Oklahoma, 1950, with Departures from Average[1]

Month	Temperature, °F. 1950 mean	Temperature, °F. Departure from average	Precipitation, inches 1950 total	Precipitation, inches Departure from average
January	37.4	1.4	1.51	-.53
February	43.0	1.9	1.70	.17
March	45.9	-3.8	1.11	-1.87
April	56.1	-3.3	2.38	-2.11
May	65.6	-1.9	5.86	.77
June	75.2*	-1.7	5.39	-.36
July	74.3	-7.1	7.07	4.01
August	73.0	-7.9	7.81	4.25
September	68.1	-5.4	2.48	-2.38
October	65.7	3.5	3.05	-1.70
November	45.4	-2.7	tr[2]	-2.96
December	35.9*	-3.1	.15	-2.02
Annual	57.1	-2.5	38.51	-4.73

[1] Temperature and precipitation records, 1922-1954.

[2] Trace.

* High temperature 100° June 26, low temperature 1° December 6.

Source: U.S. Department of Commerce, Weather Bureau, Climatological Data, Annual Summary (Washington. Vol. 37, No. 13, 1950), 224-227.

season of 1950 was somewhat cooler than average, with abnormally heavy rains in July and August, which served to prolong the period of effectiveness of pastures in the area.

Topography

The terrain of the area studied lay physiographically in the Ozark and Eastern Prairie provinces, varying from gently rolling to rough. The eastern portions of Ottawa and Delaware Counties sloped westward toward the Noesho River and were a portion of the Ozark province. The area drained by tributaries of the Neosho was deeply eroded, with sandstone and limestone strata exposed in many places. Shale and cherty limestone formations formed small buttes and conical hills. The Neosho River separated the Prairie and Ozark regions, but the definite boundary was concealed with deposits of alluvium.

Nowata, Craig, and the western portions of Ottawa and Delaware Counties were included in the Prairie provinces, typified by gently undulating relief interspersed with limestone outcroppings and escarpments formed by an erosion-resistive caprock stratum. The Verdigris River, fed by Big Creek, was the principal stream in Nowata County. The four counties were a portion of the drainage system serving the Arkansas and Mississippi Rivers.

Soils[2]

The soils of the area were comprised of upland, terrace and alluvial stream-bottom deposits. As implied in the terminology describing the soils, vast differences prevailed in organic matter content, permeability of the subsoils, and texture of the soil mass between these groups and their sub-groups. Of the 52 farms under

[2] M.H. Layton and O.H. Brensing, Soil Survey of Mayes County, Oklahoma (United States Department of Agriculture, 1937.)

study 33 were located on soils well adapted to the native tall grasses while the remaining 19 farms were in the Blackjack or Oak-Hickory groups. Each of the major classifications was described in some detail to facilitate a better understanding of one of the basic resources at the disposal of the farm operators.

Uplands and terraces

The upland and terrace soils were the predominant farming soils in the area and had the most influence in determining the type of agriculture carried on in the counties under study.

The soils of this group differed widely in many features, including color, the character of the subsoil, and the underlying parent material. All these features had their influence on productivity. The most obvious and striking difference in these soils was their color. A soil of light color indicated not only a lack of organic matter but also a lack of other chemical and physical properties that determined productivity. The light color of the surface soils was coextensive with a heavy compact condition of the subsoil and characterized the Blackjack or Oak-Hickory groups.

A soil that had a dark color in the surface layer, imparted by a small percentage of black organic matter, was very favorable for crop production and well adapted to the native grass requirements. This soil group was associated with permeable subsoils that further increased their superiority.

Alluvial soils

The alluvial soils occurred along the flood plains of the Neosho and Verdigris Rivers and also along a number of the larger creeks in the prairie section of the area. They consisted of materials washed mostly from the soils of the prairies of eastern Kansas and Oklahoma.

The soils were deep, readily permeable, and held a good supply of available moisture well into periods of light rainfall, thereby affording very favorable moisture conditions when the prairie and other upland soils were very dry and crops on them were suffering from lack of moisture. These soils overflowed occasionally for short periods. The surface soils were brown and the subsoils brown or yellowish brown, crumbly, and friable.

These soils were very productive, and practically all the land occupied by them was in cultivation. They were the best soils in the area for growing corn and feed crops because of their excellent moisture conditions and their inherent fertility. They were slightly acid or neutral in reaction.

CHAPTER II

DESCRIPTION OF THE FARMS STUDIED

The farms included in this study were not essentially different from the general run of farms in the community except that they sold whole milk to manufacturing plants. Other farms in the area also kept dairy cows. A few sold milk for fluid consumption and several sold cream. Although these operators averaged 9 years of experience at dairying, 25 of the 52 farmers had been dairying for 5 years or less and much of their previous experience was at selling cream rather than whole milk for any purpose. While only 16 of these men had milking machines and only 3 had coolers, of which 1 was a barrel, 24 had retained their cream separators. In fact, these dairymen were commonly referred to as "converted skimmers".

With the exception of the farms that sold milk for fluid consumption and a number of beef cattle ranches, most of the farms of the area would resemble those studied in matters of size, land use, soils, crop yields, and many other factors. For this reason it was thought that the type of internal farm organization and the results achieved by the farms included in the study were indicative of what might be expected for other individual farms if they should change over to the sale of manufacture milk.

Land Use

The average size of these farms, in terms of geographic area, was 164.7 acres (Table 2). The farm having the smallest area was 10 acres, with no crops and no pasture, while the largest was 610

acres with 274 acres of crop land and 315 acres of permanent pasture.

The size of the farm was related to the operator's ownership. The 24 farms entirely owned by the operator were the smallest in size, averaging 93 acres per farm. The 22 part-owner farms averaged 234 acres of land, of which 132 acres were owned and an additional 102 acres rented. Six tenant farms averaged 198 acres in size.

Of the 52 farms in the study, 8 were devoted entirely to pasture, buildings, and idle or waste land. The average area devoted to crops was 76.7 acres per farm, which accounted for 46.6 percent of the total farm area. Cleared permanent pasture plus wooded pasture accounted for 44.4 percent of the land under operation with waste or idle land accounting for the remaining farm area.

Table 2

Distribution of Farm Acreage

Use of land area	Number of farms reporting	Acres per farm (all farms)	Percent of total farm area
Crops	44	76.7	46.6
Permanent pasture, cleared	49	53.0	32.2
Woods pastured	26	20.2	12.2
Woods not pastured	6	1.2	.7
Buildings, etc.	52	3.6	2.2
Idle and Waste land	15	10.0	6.1
Total	52	164.7	100.0

The ratio of crop to pasture land varied among individual farms but in general was directly related to the total acres operated (Table 3). For example, the 16 farms of less than 100 acres averaged only 27.4 percent of their land in crops but 64.2 percent in pasture, or 2.3 acres of pasture for each acre of crops, whereas the 7 farms

of 300 or more acres averaged 1.6 acres of cropland for each acre of pasture.

Table 3

Relation of Total Acres in Farm to the Percentage of Land in Crops and Pasture.

Acres per farm	Number of farms	Average acres in total farm	Percent of land area		Ratio of pasture to cropland
			Crops	Pasture	
Less than 100	16	58.0	27.4	64.2	2.34
100 to 199	23	135.7	40.9	52.0	1.27
200 to 299	6	241.5	51.8	37.8	.73
300 or more	7	437.9	55.7	33.8	.61
All farms	52	164.7	46.6	44.4	.95

Two divergent tendencies were indicated. On the smaller farms, mostly owned by the operators, the sale of manufacture milk represented an effort to enlarge (or intensify) the business on a limited acreage. On the larger farms, which included most of the additional land that was rented, much of the rented land was used for crops and the dairying represented a sideline as it had during the days of skimming and cream-selling.

The distribution of farm-acreage sizes showed perhaps more evidences of the old Indian land-survey than of the more modern rectangular pattern. Not only were the crooked roads of the area at variance with section lines for topographic reasons, but even many of the straight roads paralleled, or traversed obliquely, rather than following these lines of more recent survey. Only 15 of the 52 farms were composed of multiples of 40 acres (Table 4). The remaining 71 percent of the farms represented a combination of the influence of the Indian land-survey and the renting of odd parcels of land in addition to that owned by the operator.

Table 4

Frequency of Farm Sizes in
Relation to the Rectangular Land Survey.

Multiples of 40 acres		Other farm sizes	
Acres per farm	Number of farms	Acres per farm	Number of farms
40	2	Less than 40	2
80	1	41 to 79	9
120	6	81 to 119	6
160	2	121 to 159	8
200	-	161 to 199	3
240	1	201 to 239	3
280	1	241 to 279	-
320	1	281 to 319	1
360	1	321 to 359	1
More than 360	-	361 or more	4
Total	15	Total	37

Crops

Corn and the small cereal grains occupied 60.1 percent of the total land in cultivation, while 33.0 percent was utilized for the production of soybeans and mungbeans, lespedeza, and prairie hay (Table 5). The small remaining portion of the cropland was devoted to sorghum roughages, other hays, seed crops, and miscellaneous uses.

Corn for grain was predominantly the favorite crop, for the farms averaged 19.2 acres of corn with yields ranging from 10 to 50 bushels per acre, averaging 24.1. Oats for grain was raised on 22 farms and occupied the largest proportion of the land devoted to small grain, accounting for 22.0 percent of the total cropland and averaging 17.3 bushels per acres. In northeastern Oklahoma sorghum grain was not a major source of homegrown concentrate feed. Damp climatic conditions

Table 5

Crop Acreages and Yields

Crop	Number of farms	Acres per farm (all farms)	Percent of crop area	Yield per acre
Corn for grain	33	19.2	25.1	24.1 bushels
Oats	22	16.9	22.0	17.3 "
Wheat	12	9.8	12.8	14.8 "
Barley	1	.2	.2	- - - - - - -
Sorghum	3	1.1	1.5	20.9 bushels
Beans for seed	7	5.2	6.8	14.7 bushels
Sorghum head feed	4	.6	.8	5.2 cwt.
Sorghum bundle feed	7	2.3	2.9	.9 ton
Silage	1	.1	.2	- - - - - - -
Prairie hay	22	12.5	16.4	1.4 ton
Lespedeza hay	15	7.8	10.2	.9 "
Bean hay	5	.6	.8	1.2 "
Oats for hay	4	.7	.8	.8 "
Alfalfa hay	2	.1	.1	1.0 "
Sudan hay	1	.1	.1	- - - - - - -
Lespedeza seed	3	.2	.2	3.5 cwt.
Red Clover seed	1	1/	1/	- - - - - - -
Commercial vegetables	2	1/	1/	- - - - - - -
Annual pastures	8	1.4	2.0	54.9 AUD_{ff}. 2/
Legumes plowed under	1	.3	.4	- - - - - - -
Idle cropland	9	2.2	2.8	
Total crops	44	81.3	106.1	
Less double cropping	9	4.6	6.1	
Acres used for crops	44	76.7	100.0	

1/ Not over 0.5 acre or percent.
2/ Animal-unit days full-forage equivalent.

retarded high yields and often impaired the quality at harvest time, while bird pests annually harvested a large proportion of the crop.

The roughage feeds grown were predominantly prairie and lespedeza hays. Prairie hay was grown on 22 farms and produced an average yield of 1.4 tons per acre. Lespedeza hay occupied 7.8 acres per farm and produced .9 ton per acre. Sorghum bundlefeed and silage were grown by 8 farms and occupied only 3.1 percent of the total cropland.

The operators were not producing heavily the high protein feeds required by the cow for heavy lactation nor were they utilizing silos to preserve their sorghum crops.

Annual pasture crops were not the main source of pasture for they were grown on but 8 farms. Pastures for livestock were usually native grasslands supplemented by winter cereal crops and by sorghum and small grain stubbles after harvest.

Miscellaneous uses such as seed crops, commercial vegetables, green manure combinations, new seedings of vetch and ryegrass, and idle cropland comprised the remaining land under cultivation on the manufacture-milk farms.

Livestock

The northeastern Oklahoma manufacture-milk farms kept a variety of animals. The average amount of livestock was 17.6 animal units per farm, of which 49 percent was milk cows and 70 percent dairy animals of all kinds (Table 6). Hogs, beef cattle, and poultry usually claimed the role of subsidiary enterprises. Eleven percent of the livestock was beef animals, while 8 percent represented horses and mules kept on 36 of the 52 farms.

The average number of dairy cows was 8.67 per farm. All farms reported grade cows while 5 operators also had some purebred stock. The farmers estimated the average value of their grade dairy cows to be $185.02 per head as of January 1, in comparison with $198.79 per head at the end of the year. Purebred cows were valued at $220.83 at the beginning and $249.29 at the end of the year. These changes in value may be compared with the averages reported by the United States Department of Agriculture for all milk cows on Oklahoma

Table 6.--Average Amount and Value of Livestock Kept.

Kind	Number of farms	Average number per farm		Average value per farm		Animal units per farm
		Jan. 1	Dec. 31	Jan. 1	Dec. 31	
Cows, grade	52	8.50	8.37	$185.02	$198.79	8.55
Cows, purebred	5	0.12	0.13	220.83	249.29	.12
Heifers, over 1 year, grade	40	2.63	2.63	142.95	129.32	1.64
Heifers, under 1 year, grade	49	2.36	2.46	67.68	68.91	.90
Heifers, under 1 year, purebred	1	-	0.02	-	100.00	3/
Veals and bob 1/ calves 2/	44	0.12	0.27	30.00	58.12	.64
Bull calves to raise, grade	6	0.04	0.08	45.00	57.50	.03
Bulls used for dairy, grade	28	0.35	0.37	159.44	209.26	.36
Bulls used for dairy, purebred	6	0.13	0.10	180.71	275.00	.12
Beef cows	6	1.21	1.21	163.41	165.00	1.21
Beef heifers, for breeding	2	0.19	0.19	112.00	164.00	.10
Beef bulls, not used for dairy	2	0.04	0.06	172.50	166.67	.05
Beef calves	17	0.44	0.46	43.56	61.67	.17
Beef yearlings	6	0.48	0.67	104.40	105.00	.36
Brood sows	25	0.69	0.56	46.67	49.79	.12
Breeding boars	6	0.08	0.06	46.25	48.34	.01
Other hogs raised 2/	34	2.42	2.67	18.12	20.76	.09
Ewes and bucks	2	0.31	0.27	12.00	19.00	.04
Goats	2	0.98	0.92	5.02	5.02	.14
Kids	1	-	0.29	-	2.53	.01
Mature chickens	51	82.71	89.06	1.00	0.99	.86
Chickens raised 2/	40	38.46	19.23	0.15	0.50	.57
Other mature poultry	8	1.48	1.13	0.88	1.05	.03
Bees	5	0.21	0.17	4.54	5.00	-
Breeding rabbits	1	-	0.10	-	5.00	3/
Rabbits raised	1	-	0.15	-	0.25	3/
Horses and mules	36	1.58	1.40	34.28	34.70	1.49
Colts	2	0.02	0.02	50.00	50.00	.01
Total	52					17.62

1/ Sold at birth.

2/ Number and value of animals raised for sale:

Kind	Number per farm	Value per head
Dairy veals	3.21	$55.52
Dairy bob calves	1.36	21.48
Fat hogs	9.38	33.77
Pigs	2.77	12.62
Kids	0.29	2.53
Chickens	229.77	0.80

3/ Too small for significant figures.

farms January 1, 1950, at $141 and January 1, 1951, at $191 or an increase of $50 per head.1/ According to the farmer's estimates, cows on the farms studied failed by approximately $36 per head for grades and $22 per head for purebreds to increase in value as much as the average Oklahoma milk cow in the same time.

To perpetuate their milking herds 40 operators kept heifers that were more than one year of age and had not yet freshened. To replace these animals as they were absorbed into the cow herds 49 farms kept heifers that were less than one year of age. Thus, to support or enlarge the milking herd, the operators were raising an average of 2.63 heifers over one year of age and 2.46 heifers under one year of age. As of December 31, 1950, the farm operators estimated the average value of their heifers at $129.32 and $68.91, respectively.

A portion of the corn raised for grain was marketed through the subsidiary hog enterprise, for 25 farms reported brood sows in their inventory and 34 farms marketed fat hogs and pigs. The hogs also consumed milk that had become sour, plus a small amount of sweetmilk from the household or direct from the dairy.

Laying flocks were kept on 51 farms, averaging 86 birds per farm. Chickens raised for sale, home use, and flock replacement averaged about 230 per farm.

Other kinds of livestock were of minor importance on the farms studied.

Capital Investment

The average capital invested in the businesses of these farms for the year of the study was $15,027 per farm (Table 7). Two-thirds

1/ Agricultural Statistics, 1951, p. 388 and 1952, p. 464. U.S. Dept. of Agriculture, Washington, D.C. Corresponding United States values were $177 and $217, respectively.

Table 7.--Summary of Average Capital Investment.

Item	Average farm			Percent of total
	Beginning of year	End of year	Average	
Operating capital:				
Dairy cows	$ 1,598	$ 1,696	$ 1,647	10.9
Other dairy animals	459	637	548	3.6
Work animals	55	50	52	.3
Other livestock	475	537	506	3.3
All livestock	$ 2,587	$ 2,920	$ 2,753	18.1
Automobile, farm share	$ 148	$ 145	$ 146	.9
Truck, farm share	219	247	233	1.5
Tractors	477	546	512	3.4
Dairy equipment	104	105	105	.6
Other farm equipment	696	971	834	6.5
All equipment	$ 1,644	$ 2,014	$ 1,830	12.9
Feed and supplies	$ 262	$ 354	$ 308	2.0
Total operating	$ 4,493	$ 5,288	$ 4,891	33.0
Real estate:				
Operator's dwelling	$ 1,926	$ 1,949	$ 1,938	12.8
Dairy buildings	1,037	1,010	1,023	6.8
All other buildings	563	553	558	3.6
All buildings	$ 3,526	$ 3,512	$ 3,519	23.2
Cropland	$ 4,010	$ 4,010	$ 4,010	26.6
Pasture land	2,178	2,178	2,178	14.4
Other land	429	429	429	2.8
All land	$ 6,617	$ 6,617	$ 6,617	43.8
Total real estate	$10,143	$10,129	$10,136	67.0
Total farm capital	$14,636	$15,417	$15,027	100.0

of the capital was invested in real estate and one-third in other assets. Dairy animals, buildings used by the dairy, and special dairy equipment amounted to $3323 per farm, or 21.9 percent of the total investment. This figure provided a rough indication of the average additional investment sufficient to transform the usual type of general farm of similar size into a manufacture-milk producing farm like those in the area in the year of the study. Only about $1650, i.e., one-ninth of the total capital, or one-third of the working capital, was invested directly in milk cows.

The average investment was increased $781 per farm during the year. This came about through an increase in the quantity of feed and supplies, purchases of additional general farm machinery, and increased livestock values due partly to the rise in prices already mentioned.

Capital investments varied from $3812 to $64,479 per farm. About 17 percent of the farms had investments exceeding $20,000 while 36 percent or 19 farms had capital structures of less than $10,000. A farm business which fell in this lower range of capital investments was extremely difficult to manage efficiently to provide a satisfactory yearly income for the operator and his family. It was a source of subsistence rather than production for commercial markets.

Receipts:

Total business receipts averaged $4127 per farm (Table 8). The main source of income was the sale of milk for manufacture which comprised 26.8 percent of total receipts. The entire dairy enterprise including net increases in the value of animals, was responsible for $1775, or 43.0 percent of the receipts. All livestock accounted for

64.8 percent of total receipts. The remaining income was derived primarily from the sale of crops and from labor or custom machine-use off the farm. Government payments comprised less than 1.0 percent of total income in the year of the study.

Table 8

Distribution of Receipts.

Source	Average per farm	Percent of total
Sales of milk for manufacture	$ 1,107	26.8
Other dairy products	29	.7
Net increase in value of dairy animals	639	15.5
Total dairy	$ 1,775	43.0
Poultry and eggs	$ 364	8.8
Other livestock 1/	535	13.0
Total other livestock	$ 899	21.8
Crop sales	$ 792	19.2
Increase in feed and supplies	92	2.2
Total crops	$ 884	21.4
Labor and machine-use off farm	$ 478	11.6
Government payments	18	.4
Miscellaneous off-farm	73	1.8
Total miscellaneous	$ 569	13.8
Total business receipts	$ 4,127	100.0

1/ Other livestock income included wool, honey, boar service fees, and the net increase in the value of all livestock except dairy and poultry, adjusted for decreases that occurred on some farms.

No farm exactly fitted the description of the "average" farm, for a wide variation occurred in receipts and their sources. At the extremes were two farms whose total receipts were $595 and $22,671, respectively. The farm of lowest receipts was an owner-operated farm of 10 acres. The farm had but 2 cows, which was the smallest herd in the study. At the other extreme was a part-owner farm of 605 acres, of which 205 were rented and 400 owned. This farm's dairy herd averaged 17.0 cows for the year, but the major source of income was crop sales, which totaled $17,082. One-half of the farms under study had total receipts of $3500 or less, with 8 farms receiving less than $2000. Meanwhile, 13 farms received more than $5000, but only 5 earned $7500 or more.

Expenses:

Business expenses incurred by the farms under study averaged $3112 (Table 9). Labor was the most expensive agent of production. However, the actual outlay averaged but $68 per farm with $735 assessed the business for unpaid labor performed by members of the operator's household.

Direct dairy expenses amounted to $712 per farm, or 22.9 percent of the total farm expense. More than three-fourths of this was for feed. Mixed dairy rations of 16-, 18-, and 32-percent protein accounted for about one-half of the outlay for purchased dairy feeds. Cottonseed meal, millrun, bran, oats, and corn were the remaining more important feeds purchased for the dairy. Other livestock cost $354 or 11.4 percent of the total farm expense. Again, the purchase of feed was the major cost.

The livestock character of these farms was noticeable through

Table 9

Distribution of Expenses.

Item	Average per farm	Percent of total
Hired labor and board	$ 68	2.2
Unpaid labor (except operator)	735	23.6
Total labor except operator	$ 803	25.8
Dairy feed purchased	$ 547	17.6
Milk hauling hired	106	3.4
Dairy supplies 1/	48	.4
Taxes on dairy animals	11	1.5
Total direct dairy expense	$ 712	22.9
Non-dairy feed and bedding bought	$ 350	11.3
Miscellaneous livestock expense 2/	4	.1
Total other livestock expense	$ 354	11.4
Seeds purchased	$ 70	2.2
Lime and fertilizer	89	2.9
Custom work hired	97	3.1
Miscellaneous crop expense 3/	34	1.1
Total direct crop expense	$ 290	9.3
Farm share auto, truck, tractor 4/	$ 495	15.9
Net decrease, general farm equipment	121	3.9
Net decrease, dairy equipment	19	.6
Miscellaneous equipment expense	21	.7
Total machinery and equipment	$ 656	21.1
Building expenses 5/	$ 177	5.7
Fences, land clearing, etc.	47	1.5
Real estate taxes	44	1.4
Total real estate	$ 268	8.6
Farm share electricity and telephone	$ 20	.6
Miscellaneous farm expenses	9	.3
Total miscellaneous	$ 29	.9
Total farm business expenses	$3112	100.0

1/ Veterinary and medicines, vaccination, and association dues or fees were included with towels, cleanser, strainer pads, and other dairy supplies.

2/ Miscellaneous livestock expenses included bee supplies, egg cases, sheep shearing, insurance on animals, and the prorated share of personal property taxes.

3/ Miscellaneous crop expenses included crop insurance, twine, bale ties, and hired storage.

4/ Auto, truck, and tractor expenses included the farm business share of all operating costs and net decreases in inventory values adjusted for differences in purchases and sales.

5/ Building expenses included net decreases in inventories plus repairs, supplies, and insurance.

the relative importance of direct livestock expenses, of which feed made up 76.8 percent, and by the relative unimportance of direct crop-production expense, which amounted to $290, or less than one-tenth of the total farm expense. Indirectly, the machinery and equipment expense would also have to be borne by the crop and livestock enterprises. Depreciation, interest, taxes, and operating expenses of machinery cost $656 or only $65 less than the total direct dairy expense.

Real estate and the miscellaneous expenses of the farm operation were not as costly as may have been expected. Real-estate taxes averaged $44 per farm or 1.4 percent of the total farm business expense while building depreciation, supplies, insurance, and repairs cost $177 per farm. Few new farm buildings were erected during the year.

Total farming costs:

Interest on capital was 12.8 percent of the total cost of farming (Table 10). About one-half of the total farm cost was labor expense while the remaining costs were chargeable to current operations except labor. About one-eight of the total farming cost was due the operator's family for their labor. The operator's wage, or the wage necessary to induce someone to do the operator's work, accounted for more than one-third of the total farming cost. These costs were not necessarily met in full by the farm business. Of first priority were current operating expenses, followed by interest payments if the farms were not owned. Only after these expenses were paid could the operator and his family share the benefits of income earned through the farm. Since labor comprised approximately one-half the total farming cost, its use needed to be given close scrutiny when the operator sought methods of decreasing costs or of increasing returns from his farm.

Labor that was not used efficiently or that was used for unproductive work did not add to the product and was partially wasted just as surely as if no work had been performed. Many farms in this study were handicapped in returns, for they did not provide a full year of productive work for the operator. Because labor costs were approximately four times as great as interest on capital, the most appropriate measure of financial success for these farms was operator's labor income. The farms generally did not represent large capital investments.

Table 10

Summary of Total Farming Costs

Item	Average per farm	Percent of total
Current expenses except labor	$ 2,309	39.3
Labor expenses:		
Labor, hired	$ 68	1.2
Labor, unpaid family	735	12.5
Labor, operator	2,007	34.2
Total labor	$ 2,810	47.9
Interest on capital	752	12.8
Total	$ 5,871	100.0

Profits:

Several methods may be used to measure the profit of a farm business. On small farms having low capital investments it may be desirable to measure the financial success of the farm by its ability to pay the operator a wage. Farms with large capital requirements may be considered more from the standpoint of investments, whereupon the ability of the business to return a given rate of interest may be

the measure of financial success desired. Furthermore, the farm provided a home for the operator and most of the operators produced goods for home consumption. The operators that had large families usually produced more goods for home consumption than did the small family farms. It is not known whether the labor and other resources consumed by the production of these household goods would have returned a greater profit to the farm business if they had been directed toward commercial production.

The manufacture-milk farms under study did not generally have large volumes of business. Capital investments averaged $15,027 per farm while receipts were but $4127 (Table 11). With this volume of receipts a complete business turnover would require approximately 3.6 years. However, the year's expense of business operations averaged $3112 per farm leaving an average income of $1015 to pay for operator's time and for the use of capital.

The average farm business earned sufficient income to pay the interest on its investment but this left only $263 to pay the operator for his labor.

Farm privileges furnished the household averaged $582 per farm. Included among those privileges were the meat, milk, eggs, vegetables and garden produce, nuts, and field corn consumed by the farm family, and the use of the farm home. These items decreased the cash expenses for farm family living. Because labor was required to produce most of these items, their value was added to the labor income to make total labor earnings of $845 per farm.

To permit the operator to draw from the business the amount which he estimated that his work would have cost if hired, the average

farm lacked $992 of providing anything to pay for the use of capital. This was a rate of return of -6.6 percent on the investment.

Returns on the capital investment ranged from $-4672 to $13,198. Sixteen farms failed to meet operating expenses while 14 met their expenses and earned labor incomes of more than $1000 per farm.

Table II

Summary of Average Farm Profits

Item	Average per farm
Average capital invested in the business	$ 15,027
Receipts from the year's business operations	$ 4,127
Business expenses for the year	3,112
Farm income (return to capital and operator's time)	$ 1,015
Interest on average capital investment	752
Labor income	$ 263
Farm privileges furnished to the household	582
Labor earnings	$ 845
Farm income (return to capital and operator's time)	$ 1,015
Average estimated value of operator's time	2,007
Return to pay for use of capital	$ -992
Rate of return on capital	-6.6%

CHAPTER III

THE DAIRY ENTERPRISE

The Herd

The northeastern Oklahoma dairy farms under study kept cows of Holstein, Guernsey, Jersey, Shorthorn, Hereford, Brown Swiss, Ayrshire, and mixed breeds, with Jersey being the most common single breed (Table 12). Nearly one-third of the cows were of mixed or indeterminate breeds, but probably many of these were of partial Jersey extraction. Purebred cows were rare, as only 9 of the 455 cows in the milking herds at the end of the year were designated as purebred.

Table 12.

Cattle Breeds Represented on 52
Dairy farms of Northeastern Oklahoma, 1950

Breed	Total cows		Percent purebred	Percent of total cows
	Purebred	Grade		
Holstein	2	42	4.5	9.7
Guernsey	-	47	-	10.3
Jersey	1	103	1.0	22.9
Shorthorn	4	61	6.2	14.3
Hereford	-	30	-	6.6
Brown Swiss	-	19	-	4.2
Ayrshire	2	-	100.0	.4
Mixed breeds	-	144	-	31.6
Total	9	446	2.0	100.0

Of the cows in this study, 225 or 49.6 percent were 4 to 7 years of age. Flanking this age group were 87 cows 3 to 4 and 81 that were 7 to 10 years old. Twenty-eight percent of the cows enumerated were less than 4, and 22.2 percent more than 7 years of age. The age of a dairy cow is of prime importance in the production of milk. As the cow reaches advanced age, difficulty in calving may occur and milk production capacity may decrease, for biological processes generally begin a gradual decline in efficiency. No tendency toward the use of aged cows was especially apparent on these farms, as only 4.4 percent of them were more than 10 years old.

Wide variation occurred among the farms in the number of cows kept by the operator. The extreme range was from 2.0 to 20.4 cows per farm. The average was 8.7 cows (Table 13). Three-fourths of the farms maintained herds of 6 or more cows, and six farms had 14 or more cows each.

Table 13

Variation in the Number of Cows per Farm.

Cows per farm	Number of farms	Percent of farms
Less than 3	2	3.8
3 to 5	11	21.2
6 to 8	19	36.5
9 to 11	8	15.5
12 to 14	6	11.5
14 or more	6	11.5
Total	52	100.0

Thirty-four farms kept bulls for at least a portion of the year. Fifteen operators kept no bull but borrowed bull services from their neighbors. One farm used artificial insemination. The predominant bull breeds were Shorthorn and Hereford, as 35 of the 49 bulls listed by breed were of dual-purpose or beef type. This exemplified the desire of the operators to produce calves having the conformation and markings of beef animals.

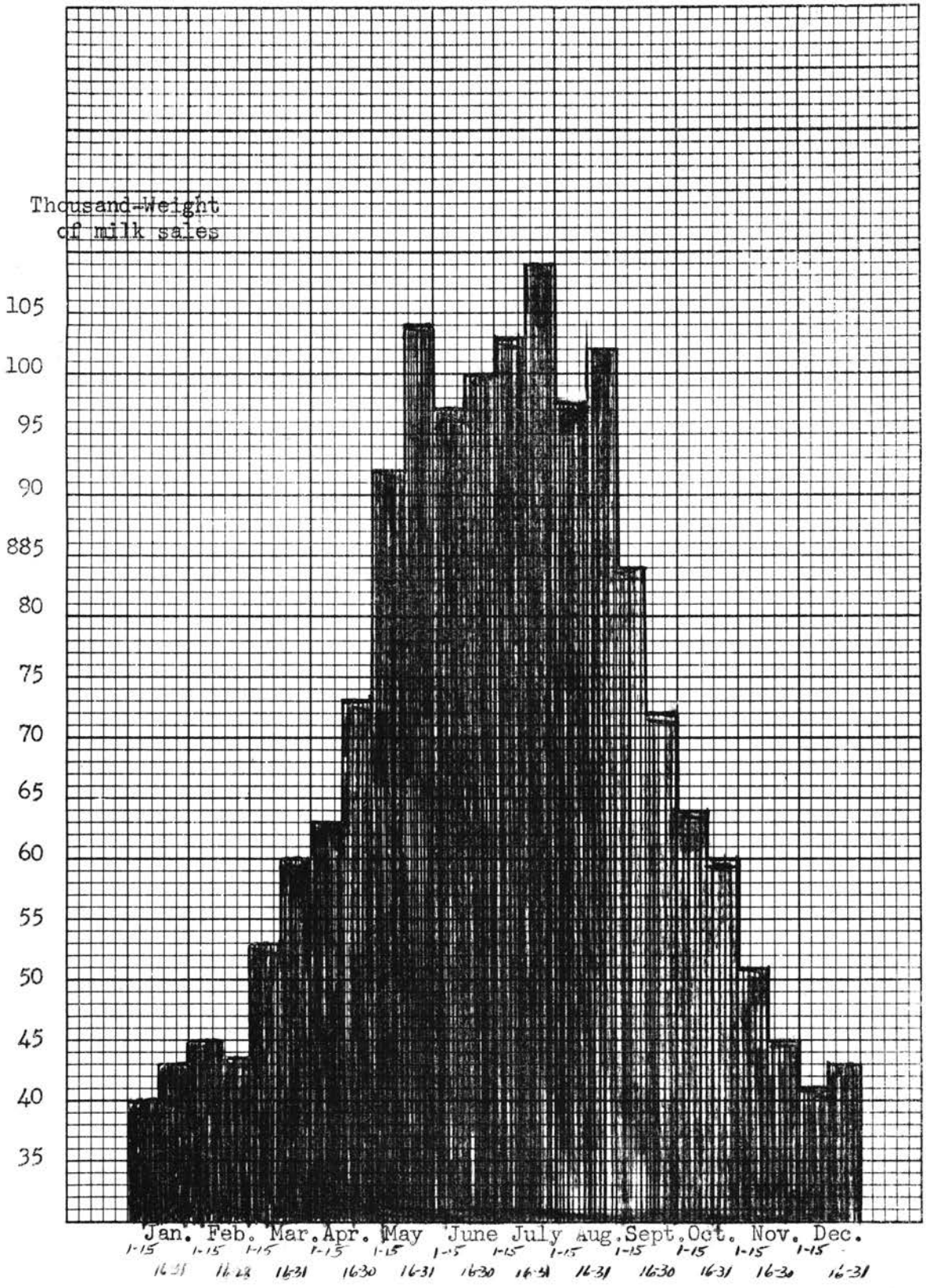
Milk Production

Seasonality of production was directly correlated with the spring and summer pasture season (Figure 1). The operators bred their cows to freshen in late winter or early spring, with 52.5 percent of the calves being born in February, March, April and May. Freshening at this time, the majority of the cows were not producing heavily or were dry during the months of December, January and February. This seasonality of milk production evidenced the unwillingness of the producers to freshen cows in the autumn months for balanced milk production throughout the year. Owing to its effect on pasture condition, the abnormally cool rainy season in July and August undoubtedly prolonged the period of peak milk production later in 1950 than usual.

The farms were not equipped to meet the sanitary requirements of A-grade milk producers, nor did they receive comparable prices for their product. Thirty-six of the producers milked by hand while 16 used various kinds of milking machines. Little correlation was found between the size of herd and the possession of a milking machine, for the operators that used milkers averaged but 8.8 cows in their herds.

Milk production per cow varied from 2400 to 11,400 pounds, averaging 5160 (Table 14). Only four herds produced more than 10,000

Figure 1 -- Bi-Monthly Distribution of Total Milk Sales on 52 Northeastern Oklahoma Manufacture-Milk Dairies, 1950.



pounds per cow as a herd average. The typical cow lactated heavily 3 to 4 months after freshening. With the onset of summer and consequent toughening of native grass pastures, the inability to produce heavily for the entire milking period caused output per farm to decline rapidly after July.

Table 14

Variation in Annual Milk Production per Cow.

Pounds produced per cow	Number of farms	Percent of farms
Less than 3,000	3	5.7
3,000 to 4,999	24	46.2
5,000 to 6,999	13	25.1
7,000 to 8,999	6	11.5
9,000 or more	6	11.5
Total	52	100.0

Milk Disposition

Of the 44,788 pounds of milk produced per farm, only 73.5 percent, or less than three-fourths, was sold (Table 15). Most of that used on the farm was fed to calves. Under average conditions on these farms only slightly less than 1 out of every 5 cows was kept solely for the purpose of feeding calves. This amounted to 1.7 nurse cows per farm. In line with the prevalence of using beef-type bulls this practice emphasized the relative importance placed by farmers on the production of cattle meat in comparison with milk for sale. Calves raised as replacements for the dairy herd or herd bulls were fed 57.7 percent less milk than was consumed by the veal and beef-type calves. Milk used by the farm household averaged 2.1 quarts per day.

In order to determine the net cost of producing that portion of

the milk that was sold, the milk used on the farm was credited to cows at the plant price less the cost of hauling. This averaged $3.03 per hundredweight and amounted to $360 per farm, of which $264 represented whole milk fed to calves.

Table 15.

Milk Disposition, 52 Northeastern Oklahoma Manufacture Milk Dairies, 1950.

	Pounds	Percent of Total	Value
Milk sold			
Wholesale	1,689,390	72.6	$ 52,043.82
Retail	21,660	.9	1,511.16
Total sales	1,711,050	73.5	$ 53,554.98
Milk used on the farm			
Household	164,380	7.0	5,013.20
Dairy calves	130,001	5.6	4,057.77
Other calves	307,282	13.2	9,183.69
Other stock	15,235	.7	454.85
Total, home use	616,898	26.5	18,709.51
Total produced	2,327,948	100.0	$ 72,264.49

The proportion of the milk that was used on the farm where it was produced varied considerably among the individual farms. (Table 16). Whereas the average was 26.5 percent of all milk produced, 20 of the 52 farms used less than 20 percent of their milk at home. It might be said that these farms were as nearly commercial dairies as could be found among the producers of milk for manufacture. On the other hand, 10 farms used 40 percent or more of their total milk production on their own farms, 5 farms consuming more than one-half their total production. Some of these farms were quite small and were of the nature of subsistence dairies, whereas the larger herds among them represented side-

line dairying supplementary to the production of calves for meat purposes.

Table 16

Variation in the Proportion of Total Milk Production Used on the Farm, 52 Northeast Oklahoma Manufacture-Milk Dairies, 1950

Percent of milk used on the farm	Number of farms	Percent of farms
Less than 10	3	5.8
10 to 19.9	17	32.7
20 to 29.9	14	26.9
30 to 39.9	8	15.4
40 to 49.9	5	9.6
50 or more	5	9.6
Total	52	100.0

Costs and Returns in Producing Milk

It was for the purpose of establishing a standard, a basis for comparisons upon which decisions might be based, that costs and returns of milk production were recorded and analyzed. The cost and quantitative requirements of various items shift with the course of time. Nonetheless, the relative importance of the major inputs required for milk production is not subject to radical change in the short run. This is true because the biological requirements are not quickly altered; i.e., cows must be fed and labor expended to produce milk. The following section presents the available facts as they occurred on actual operating farms and attempts at least partly to discern their practical significance.

Average feed, labor, and other requirements of production provide a standard of comparison. Thus, the readers of this report have

at their disposal information concerning the quantitative and monetary requirements for manufacture-milk production as they existed in northeastern Oklahoma in 1950, which may be modernized by the use of existing prices and which may be adapted to conditions of resources and practices unique to the individual farmer in planning his operations.

As a result of other remunerative enterprises available to the operators in the form of cash crops, livestock enterprises, labor and custom machine work off the farm, a wide variation prevailed in the organization of the individual dairy enterprises and the entire farm operations..

The cost of keeping a cow for a year averaged $279.81 (Table 17). Credits for milk used on the farm, manure dropped by the cows, the value of the calf at birth, and appreciation in the value of the cow amounted to $84.87. When these were deducted from the total gross costs, the net cost of milk production averaged $194.94 per cow, or $5.138 per 100 pounds of milk sold.

Labor costs:

Milk production required an average of 18 minutes direct man labor per cow. Included was the time required driving cows to or from pasture, feeding, milking, cleaning barn and utensils, cooling the milk, and miscellaneous chores. Labor of calf feeding, caring for heifers and bulls, and feed processing was not counted as direct labor on cows.

The average cost of that portion of the total farm labor bill that was charged to the dairy was $0.884 per man hour. This included the cost of the operator and those members of his household actively contributing time to the dairy. Only one farm used hired labor in

Table 17

Summary of Costs and Returns of Milk Production
52 Northeastern Oklahoma Dairy Farms, 1950.

Item	Average per cow		Percent of total value	Average per 100 pounds milk sold	
	Amount	Value		Amount	Value
Milk sold:					
Manufacture, lbs.	3745	$127.57	97.4	98.7	$ 3.363
Retail, lbs.	48	3.35	2.6	1.3	.088
Total	3793	$130.92	100.0	100.0	$ 3.451
Costs:					
Salt and mineral mixes	42	$ 1.09	.4	1.1	$ 0.029
Homegrown, concentrates, lbs	1099	27.62	9.8	29.0	.728
Purchased concentrates, lbs.	1449	50.15	17.9	38.2	1.322
Succulent feeds, lbs.	124	.47	.2	3.3	.012
Dry roughage, lbs.	3701	21.03	7.5	97.6	.554
Pasture, animal-unit days	218	11.96	4.3	5.7	.315
Total feed and pasture		$112.32	40.1		$ 2.960
Direct man labor, hrs. 1/	138	$122.02	43.6	3.6	$ 3.217
Hired milk hauling		12.20	4.4		.322
Farm milk hauling		4.30	1.5		.113
Building use		6.93	2.5		.183
Interest on cows		11.57	4.1		.305
All dairy supplies		4.41	1.6		.116
Bull costs		1.26	.4		.033
Insurance and taxes on cows		.99	.4		.026
Auto and truck use, mile 1/	9	.47	.2	.2	.012
Equipment use 2/		2.11	.8		.056
Bedding, lbs.	159	.56	.2	4.2	.015
Telephone, miscellaneous		.67	.2		.018
Total gross costs		$279.81	100.0		$ 7.376
Credits:					
Calves dropped, head	1	$ 21.73	25.6		$ .573
Manure, cows, lbs.	13300	17.40	20.5	351	.459
Milk used on farm, lbs. 3/	1367	41.49	48.9	36	1.094
Appreciation in value of cows		4.25	5.0		.112
Total credits		$ 84.87	100.0		$ 2.238
Net cost of milk sold		$194.94			$ 5.138
Profit		$-64.02			$-1.687

1/ Except milk hauling.
2/ Including special dairy equipment, hired machinery, fuel, electricity, and use of saddle horse.
3/ Including household use and milk fed to calves and other livestock.

connection with the dairy enterprise. The total of direct labor cost averaged $122.02 per cow and accounted for 43.6 percent of the total gross cost of milk production.

Feed and pasture costs:

Feed costs were the second most important expense of milk production. With only one farm utilizing a silo the operators usually met their feed requirements through the use of dry roughages and grain or purchased dairy rations.

The farms enumerated produced less carbohydrate feeds than they used. While generally they produced corn, oats, barley, wheat, and some grain sorghums (Table 5), the homegrown concentrates fed to cows were but 44.9 percent of similar feeds purchased. Dairy rations were purchased on 38 farms with the 16-and 18-percent protein mixes predominating and costing an average of $38.20 per cow. The operators also purchased cottonseed meal, bran, millrun, ground grains, and soybean meal to supplement their dry roughages and grains. The homegrown and purchased concentrates cost an average of $2.05 for each hundredweight of milk sold and comprised 27.7 percent of the total costs incurred.

Dry roughage fed per cow averaged 3701 pounds. Prairie hay constituted 54.3 percent of these roughages, costing approximately $10. per cow. The remainder of the roughages used consisted of cane, sorghum bundlefeed, and oats or leguminous hays. Purchased roughages mostly prairie hay, accounted for about one-third of the total cost of dry roughages.

With the shortage in the production of concentrate feeds and with no facilities for preserving roughages in succulent form, the manufacture-milk producers in northeastern Oklahoma were largely dependent upon

native grass pastures. The long growing season and usually favorable climatic conditions were conducive to the growth of the native grasses which served as the major biological resource utilized in the production of milk. The pasture season averaged 218 days in length and was valued at $11.96 per cow, or about $1.67 per cow-month. A partial explanation of the relatively low cost was that the pasture was unimproved, the maintenance costs were low or non-existent, and the land was being used for its most productive alternative. By contrast the scarce concentrate feeds were relatively costly. At usual yields their cost of production was high, whereas transportation plus the profit margin due commercial feed dealers caused purchased feeds to be costly relative to the utilization of grasses.

Milk hauling:

After the farmer harvests his crops or finishes his livestock products for the market, he must arrange and pay for their transportation to a central receiving point. Northeastern Oklahoma was served by six manufacture-milk processing plants that for the most part assumed the responsibility of arranging the transportation of milk from the farms to the plants. The farmer was required to pay for this transportation, however, in the form of a deduction from the value of the milk. For farms that hauled part or all of their own milk, computation of costs included the value of the farm labor and the proportionate share of truck or other vehicle use involved. Hired and home milk hauling costs averaged $0.435 per hundredweight of milk sold. They made up less than 6 percent of the total cost of production.

Building use:

The cost of building use was prorated among cows, heifers, bulls and other uses according to the operator's estimate of what share each

derived from that particular building (Table 18). The average value of the building was obtained from the beginning and end inventory values, and an interest charge based on a 5 percent rate was included in the cost. Depreciation, repairs, and insurance were enumerated, and real-estate taxes were prorated according to inventory value. Insurance and rentals collected were credited to the respective building accounts.

The typical milking area was a general-purpose barn with stanchions or tie-ropes, dirt floor, and no water facilities. The cleaning of cans and utensils and some straining of milk were sometimes done in the operator's dwelling.

Table 18

Summary of Average Dairy Building Costs on 52 Manufacture-Milk Farms, 1950.

	Operator's dwelling	Dairy barn	Other barns	Other buildings	Total
Average value of building	$1,937.57	$625.65	$397.27	$540.86	$3,518.75
Costs:					
Interest	$ 1.64	$ 30.30	$ 20.33	$ 3.29	$ 55.56
Depreciation and repairs	10.38	33.42	19.31	2.31	65.42
Insurance and taxes	12.70	2.15	5.30	.56	20.71
Total costs	$ 24.72	$ 65.87	$ 55.94	$ 6.16	$ 141.69
Percentage of use to cows	5.2	54.6	45.8	40.2	42.6
Total costs to cows	$ 1.28	$ 35.96	$ 20.58	$ 2.48	$ 60.30
Average cost per cow	$ 0.15	$ 4.13	$ 2.37	$ 0.28	$ 6.93

Interest, insurance, and taxes

Interest as a cost is an item of expense that is sometimes overlooked, especially if the cattle are owned by the operator. Nevertheless, the operator usually expects his investment to earn a certain

rate of return, or else after a period of time he would liquidate his holdings and invest in another enterprise which he thought would return a greater investment-dividend ratio. Interest on the investment in cows in this study was computed at the rate of 6 percent on the monthly-weighted average annual value of the cows in the herd. It averaged $0.305 per hundredweight of milk sold or $11.57 per cow. This was 4.1 percent of the total cost of keeping a cow for a year.

Insurance premiums paid on buildings and equipment were included in the costs of those items respectively. Only 2 farms bought insurance on cows. Death losses among cows on the farms studied amounted to 2.8 percent of the average number of cows in the herd, or approximately 1 cow among 4 farms.

The prorated share of personal property taxes assessed on cows averaged $0.97 per cow.

Bull costs:

The total cost of keeping a herd bull averaged $115.20 (Table 19). Feed and pasture costs averaged $60.09, accounting for 52.2 percent of the total. Direct man labor averaged 41 hours per bull. Valued at the rate each individual operator placed on his time, this amounted to $38.98, or 33.8 percent of the total cost. This included the feeding, driving, and other chores associated with the care of both borrowed and owned bulls. The usual practice was to pasture the herd sire and cows together, although the average pasture season for bulls was one-half month longer than that for cows. Thus, no accurate breeding records were kept nor planned freshening dates established on most of the farms included in this study.

Since from the viewpoint of the dairy enterprise the bulls were

kept primarily for their breeding services on the farms, credits were allowed for services sold to other dairymen, for the value of manure produced, and for increases in the market value of the bulls, in order to determine the net cost to the owner for the bull services provided to his own dairy herd. When these credits were deducted from the gross costs of keeping the bulls, the net costs of services rendered on the home farms were found to average $20.66 per bull kept. In other words, owing to the fact that many of the bulls were young and therefore increasing in value, whereas cattle prices generally rose somewhat during the year, the bulls lacked only $20.66 of paying their own way. On several of the farms, the net cost of home-owned-bull services was shared between dairy and beef cows on the same farm. The net cost of all bull services, owned and hired, including fees for artificial insemination on a few farms, that were chargeable to dairy cows on these farms, averaged $1.26 per cow.

Other costs:

All dairy supplies were charged to the herd at prices paid for the quantities used, whether purchased outright or deducted from the milk check. These averaged $4.41 per cow. They included paper towels, strainer pads, cleansers, disinfectants, veterinary fees and medicines, and other non-durable items used in the regular operation of the dairies. Prepared calf feeds, nipple-pails, and similar items used in growing calves were charged against the rearing of young stock, not to the cows. Parts or equipment, such as teat-cup liners, hose, pails, cans, strainers, brushes, brooms, shovels, forks, and the like were included in equipment costs rather than supplies.

Table 19

Summary of Costs and Credits in Keeping Dairy Herd Bulls. 1/

	Average per bull Quanity	Cost	Percent of total
Costs:			
Homegrown concentrates, pounds	480	$ 11.06	9.6
Purchased concentrates, pounds	429	14.91	13.0
Homegrown roughages, pounds	2,787	15.08	13.1
Purchased roughages, pounds	924	5.29	4.6
Salt and minerals, pounds	47	1.16	1.0
Pasture, days	234	12.59	10.9
Total feed and pasture		$ 60.09	52.2
Direct man labor, hours	41	$ 38.98	33.8
Building use		1.94	1.7
Insurance and taxes		1.52	1.3
Interest on value of bull		12.67	11.0
Total costs		$115.20	100.0
Credits:			
Appreciation in value		$ 69.67	73.7
Manure		23.45	24.8
Breeding fees collected		1.42	1.5
Total credits		$ 94.54	100.0
Net costs		$ 20.66	

1/ Averages for 27 bulls and one-half interest in another.

All equipment-use except milk hauling averaged $2.11 per cow. This included the use of tractors, trucks, autos, and horses for moving animals either by hauling or driving and a prorated share of the cost of providing a water supply for cows on some farms. It included the costs of fuel and electricity spent on cows, as well as depreciation, repairs, and supplies for special dairy equipment and a prorated share of any general farm equipment used directly on cows. Costs of equipment used in the production of crops that were fed, and in the

preparation of feeding materials for consumption by the cows were not charged to the dairy herd, inasmuch as feedstuffs were charged directly at their equivalent market value adjusted to their location at the farm. Feed production was regarded as a separate enterprise. If it were found profitable at the prevailing market prices for feed and if the cows could pay those prices and remain in the dairy business, then feed production for the cows also would be adjudged profitable.

Only that portion of the farm share of telephone costs designated by the farm operator was charged to the cows. The small amounts of bedding that were used were charged to cows on the same basis as feeds. Most of the dairymen depended upon hay-refuse to satisfy the needs of the cows for bedding.

Milk sales:

An average of 3793 pounds of milk was sold for $130.92 per cow during the year. This was 73.5 percent of all milk produced (Table 17). Milk sold to the 6 processing plants averaged 3745 pounds per cow at an average gross price of $3.363 per hundredweight. Milk sold at retail by two farms accounted for 2.6 percent of the total sales.

Credits:

Credits averaged $84.87 per cow, for milk was not the only item of value produced by the dairy herd. The value of the dairy calf born during the year averaged $21.73. The dairy enterprise was credited only for the birth value of these calves and not for their increase in value as they grew into veals or yearlings. Calf production was considered a subsidiary enterprise that must stand on its own merits.

Milk used on the farm was a significant portion of the total milk production. The milk had an average value of $3.03 per hundred-

weight at the farm and was credited to the cows at this price, averaging $41.49 per cow.

Manure production averaged 12.7 tons per cow of which approximately 7 tons was reclaimed. The average value of manure was $2.49 per ton, or $17.40 per cow.

The net increase in the value of cows averaged $4.25. This increase considered the cows that were in the herd January 1, heifers that freshened for the first time, purchases, sales, and the end-inventory value as of December 31, 1950. The net appreciation resulted partly from the maturing of young cows added to the herd and partly from the increase in the average farm price of cows between the beginning and the end of the year (Table 6).

Profits:

The sale of liquid milk to manufacturing plants returned a negative profit for most of the farms in the study. Four farms earned $100 or more per cow, but 10 made $-135 or less.

Some farmers claimed that all the profits in milk production consisted of by-products. In this case, credits other than milk sold absorbed 30 percent of the gross costs, but this failed to make a profit. The average net loss in milk production was $64.02 per cow, or $1.687 per 100 pounds of milk sold.

This meant that instead of getting $122.02 pay for the labor of taking care of a cow for a year, the dairymen actually had left only $56 after covering all other costs. Instead of the going rate of 88 cents per hour for labor, the average net return above all other costs was only 42 cents. Although 9 dairymen got less than nothing for their labor, 28 made more than the average 42 cents, and 11 made 70 cents or more per hour.

Earnings of more than $1.00 an hour on 5 farms attested to the possibility of making relatively good wages in manufacture-milk dairying, but doubtless certain things were required which many of these farms did not have. To find out how to make the dairy and the whole farm pay better was one of the major objectives of this study.

CHAPTER IV

FACTORS AFFECTING THE TOTAL FARM INCOME AND MILK-PRODUCTION ECONOMY

Wide variations in costs and returns in milk production and in farm incomes were found among the farms included in this study. Owing to the complex nature of the farming business, these variations doubtless arose from a multiplicity of causes. With the data and other resources available to the study, it was not possible to isolate the specific cause of every income failure or each degree of financial success above the average, nor was it desirable. Such detailed treatment of each farm would have tended to obscure the presence of fundamental principles of business management. Rather, the objective was to discover such principles and determine their relative importance for the guidance of prospective and currently operating farmers in the organization and operation of their businesses for greater profit.

For this purpose, certain relationships among the characteristics of the several farms were found that had varying degrees of effect upon costs and returns in milk production and upon the income from the farm as a whole.

Probably some of the principles could have been developed <u>a priori</u> by theoretical reasoning in economic analysis. However, their development from a body of data representing actual operating farms served not only to substantiate the principles involved but also to provide assurance to farmers and other persons that these were not mere hypothetical conclusions of possibly impractical application, but were

records of actual happenings on ordinary farms taken at ramdom and not chosen for any reason except that they sold milk to manufacturing plants.

The insistence upon existence in fact, the complexity of the farm business, and the relative smallness of the number of farms from which records were obtained for the study combined to prevent the analysis of the effects of many minor factors upon the degree of financial success achieved in manufacture-milk farming. However, the effects of major factors were definitely apparent, even with so small a number of farms.

Size of Business

Commonly, the size of a farm business is loosely expressed in terms of acres. Such an expression has precision only with reference to single-crop non-livestock farms. For other farms, it is merely a factor more or less related to certain more appropriate measures of size. Although it is not an all-inclusive measure, it has the advantage of being one with which farmers and the general public are well acquainted.

Total acres in the farm:

In general, as the total acres operated per farm, including both owned and rented land, were increased among the farms in this study, other measures of the size of the operating unit also increased (Table 20). The largest-size group, operating 160 or more acres and having nearly 5 times as much land per farm, also had more crops, more pasture, and more cows than did the farms of less than 100 acres. To operate this larger area the farmers used about .3-man more labor force for the year. With more cows, they produced as much or a little more total milk per farm. The added facilities provided a greater amount of directly productive work to be done, as the farms of 160 or

more acres averaged 338 productive-man-work units as compared with only 219 for the farms of less than 100 acres. The average capital investment, including both owned and rented properties, increased from $8000 in the smallest-size group to $22,000 in the largest-size group.

Increases in other measures of size were not proportional to the increases in total acreage. While total acres increased nearly 4 times and cropland increased 8 times, pasture acres barely tripled between the smallest and largest-size groups, indicating that the larger farms had the higher ratio of cropland to pasture. An increase of about 28 percent in number of cows was not accompanied by a corresponding increase in total milk output per farm. Likewise, a 20 percent increase in average number of men permitted an increase of 35 percent in total amount of directly productive work accomplished, as a result of increased efficiency in the use of labor.

In other words, the general character, or type of the business, changed from the smallest to the largest-size farms (Table 21). The smaller farms were more intensive in nature. Whereas the average ratio of pasture to cropland was about 3 times as great among farms of less than 100 acres as among those of 160 or more acres, the utilization of this pasture by dairy cows was associated with a milk output per acre of total farm 4.5 times as great, and with the use of 4 times as much labor per acre as on the largest-size farms.

Whereas the proportions of the total productive business represented by cows and other livestock were not consistently related to total acreage, the percentage represented by crops increased and that represented by off-farm sources of income decreased, both considerably and consistently, with increases in total acres. The off-farm sources of income and the greater intensity in the application of labor and in the

production of milk (no doubt requiring stepped-up feed purchases with the low proportions of crops grown) represented efforts of the operators of small acreages to increase the scale of their operations in spite of limited land area. These differences in volume of business were not recognized by the use of acres as a measure of size. At the same time, enlargement by renting generally took the form of increased emphasis on crop production.

Livestock operation generally represented an effort to utilize pastures already available, or it might be said, to obtain what income could be mustered from the off-grade land with which the farm was already afflicted, rather than to develop the dairy as an enterprise of primary importance. In that sense, dairying remained a side-line or secondary enterprise on either small or large acreages, although it more nearly approached commercial emphasis on the smaller than on the larger holdings, and among the smaller rather than the larger herds.

As acreage per farm increased, crop and livestock production rates decreased, but certain measures of farm income showed increases (Table 22). Apparently, the largest-sized farms increased their acreages and volumes of output to the point that costs of production decreased more than production rates. The "small farm well tilled" was not the most remunerative size of farm but it returned more income than did the medium-size average-efficiency farm.

A small farm may attain production rates above average by extravagant use of labor or other inputs required in the process of producing milk, crops, or other livestock products. This results in a high cost of production. The principle was clearly demonstrated for even with their higher rates of production the smallest-size farms had a

lower rate of return on capital than did the largest-size farms. Since these were all negative, the increase really meant a lower rate of loss on capital. The percents of return on capital were somewhat misleading because a lower rate of loss partly meant that a given amount of loss was a lower percentage of a larger capital investment than a smaller one. If the largest-size farms had attained average production rates, instead of 9 percentage points below average, probably their incomes would have compared more favorably with those of the other farms.

Volume of business had an important effect on financial success, for even relatively high production rates applied to a limited quantity of product were not sufficient to overcome the high overhead costs associated with the operation of a larger but poorer farm.

Total productive-man-work units.

Because labor represented about one-half of the total cost of farm operations, the amount of directly productive labor that would have been required in the operation of the farm at average rates of accomplishment constituted an appropriate measure of the size of the farm business. Productive-man-work units provided such a standard of measurement. A productive-man-work unit was the average amount of directly productive work accomplished by one man in the usual 10-hour farm day. For example, the average amount of direct man labor spent on cows producing milk for manufacture on these farms was about 150 hours per year. Consequently, a dairy cow was said to represent 15 productive-man-work-units and a herd averaging 8.6 cows represented 129 such units (8.6 x 15 = 129). Similar figures for other enterprises were applied and combined to obtain the total for each farm. Subtotals for crops and for livestock were used as basis for computing composite yields expressed as percentages of the average for all farms and

Table 20

Relation of Total Acres in the Farm
to Other Measures of Size of Farm Business

Acres per farm	Farms	Acres per farm: Total farm	Crop-land	Past-ure	Cows per farm	Milk prod-uced (000 lb.)	Num ber of men	Man-work units per farm	Capi-tal, (000)
Less than 100	16	58	16	37	7.0	43	1.2	219	$ 8
100 to 159	18	125	44	73	8.7	43	1.4	237	12
160 or more	17	281	143	107	9.7	46	1.5	338	22

Table 21

Relation of Total Acres in the Farm
to the Type of the Business

Acres per farm	Acres pasture per acre of crops	Pounds milk per acre	Total labor cost per acre	Work units per man	Percent of man-work-units: Cows	Other live-stock	Crops	Off-farm
Less than 100	2.3	742	$ 45	176	48	16	4	32
100 to 159	1.7	344	21	167	58	18	14	10
160 or more	.8	165	11	225	48	15	33	4

Table 22

Relation of Total Acres in the Farm
to Production Rates and Income

Acres per farm	Pounds milk per cow	Production index: Crops	Live-stock	Farm	Income to capital and operator's labor	Labor income	Percent return on capital
Less than 100	7,026	166	125	124	$ 597	$ 199	-18.3
100 to 159	5,014	103	100	99	386	-214	-12.9
160 or more	4,644	91	92	91	1,097	-3	-4.2

called crop index and livestock index, respectively. A subtotal for off-farm sources of income was also computed. For brevity, the simple term "work units" was often used in place of the more complete expression.

Productive-man-work units are not commonly used by farmers as a measure of farm-business size because they are not readily available for their use. However, farmers recognize variations in the amount of productive work performed on farms of equal acreage.

As the amount of directly productive work provided by the enterprises of the business increased among these farms other measures of farm-business size also increased (Table 23). The smallest-size group had fewer cows, acres, men, and less capital than did either the medium- or largest-size groups. As productive-man-work units increased from less than 200 to 300 or more, farm area increased by 114 acres, size of labor force by .5 man, and capital investments by $8000 per farm.

Among the various departments of the farm business, acres of crops increased most, and total milk output least, in relation to the increases in total productive-man-work units. In other words, larger volumes of productive business were often achieved by operating more cropland in proportion to cows.

The type of farming changed as total productive-man-work units increased, for farms with less than 200 work units emphasized dairy more and devoted less time to off-farm work and crops than did the medium and large size groups (Table 24). Other livestock occupied about the same proportion of work units on all size groups. Farms of less than 200 man-work units had the highest pasture-crop ratio and

produced the most milk per acre of total farm.

An almost linear relationship was found between total productive-man-work units and farm income (Table 25). Between farms with less than 200 and farms with 200 to 299 work units, average farm income increased $499, while work units increased 108, or for each man-work unit of increase in size of business, farm income rose $4.62. Between farms with 200 to 299 work units and those with 300 or more, farm income increased $657 while work units increased 143, or farm income rose $4.59 for each work-unit increase in size of business. This direct relationship demonstrated the importance of having a relatively large amount of productive work if profit were the goal of the operator.

Comparison of acres and productive-man-work-units as measures of size of business:

Productive-man-work units more nearly measured the economic size of the farm business than did the total acreage operated (Table 26). The use of total acres as the only measure of farm-business size would have led the inquirer to false conclusions. Some farms had a large business on limited acreage. Some of these were grouped as "small" when sorted on total acres per farm. These farms had a relatively large proportion of their productive-man-work units devoted to off-farm labor and custom machine use. Nevertheless, they were not correctly classified and the use of acres as a measure of size did not reflect the true result of increased size of business, i.e., increased income.

When size of business was interpreted as geographic area, or total acres, it appeared to have no consistent relationship to income. When work units were used, it was found that the amount of directly productive work accomplished had an important bearing on the amount

Table 23.

Relation of Total Productive-Man-Work Units to Other Measures of Size of the Farm Business

Total productive-man-work units	Farms	Acres per farm: Total farm	Acres per farm: Crop-lans	Acres per farm: Past-ure	Cows per farm	Milk prod-uced (000 lbs.)	Num-ber of men	Man-work units per farm	Cap-ital (000)
Less than 200	14	102	35	56	5.3	43	1.1	136	$ 10
200 to 299	19	139	64	64	8.7	46	1.4	244	13
300 or more	18	216	98	96	10.8	52	1.6	387	18

Table 24

Relation of Total Productive-Man-Work-Units to the Type of Business

Total productive-man-work units	Acres of pasture per acre of crops	Pounds milk per acre	Total labor cost per acre	Work units per man	Percent of man-work units: Cows	Other live-stock	Crops	Off-farm
Less than 200	1.6	811	$ 21	120	58	19	16	7
200 to 299	1.0	529	20	171	53	20	17	10
300 or more	1.0	482	16	249	42	19	22	17

Table 25

Relation of Total Productive-Man-Work Units to Production Rates and Income

Total productive-man-work units	Pounds milk per cow	Production index: Crops	Production index: Live-stock	Production index: Total farm	Income to capital and operator's labor	Labor income	Percent return on capital
Less than 200	5,801	110	118	117	$ 95	$-425	-15.7
200 to 299	5,321	92	104	102	594	-73	-10.6
300 or more	4,841	99	91	93	1,251	367	-5.4

of the farm income. Farmers recognize this fact when they try to get a greater amount of productive work done with the same or less effort and expense. Most of them are interested in the year's pay for what they do.

Table 26

Comparison of Relationships shown by Grouping Farms by Total Acres and by Total Productive-Man-Work Units

Size group	Grouped by acres: Percent of work units: Cows	Other live-stock	Crops	Mis cella-neous	Labor income	Grouped by work units: Percent of work units: Cows	Other live-stock	Crops	Mis cella-neous	Labor income
Small	48	16	4	32	$ 199	58	19	16	7	$-425
Medium	58	18	14	10	-214	53	20	17	10	-73
Large	48	15	33	4	-3	42	19	22	17	367

Size of Herd in Relation to Total Farm Income.

Number of cows is a commonly accepted measure of the size of the dairy business (Table 27). If all farms in the study had emphasized dairying to the same degree, size of herd would very well represent size of business. This was not the case, however, for in general, the farms having the larger acreages and herds used dairying as a side-line enterprise while the small farms were usually more intent upon their dairy herd producing for the commercial market.

The chief advantage of increased size of business was improved labor efficiency. This was evident in both the acreage of crops per man and milk production per man. Milk production per man increased in spite of a decrease in production per cow because of the greater number of cows cared for by one man. Nevertheless, the decrease of crop production rates which accompanied the increase in acres of crops and capital investments plus more and poorer cows, caused a decrease in labor income.

Table 27

Relation of Size of Herd to Total Farm Income.

Cows per farm	Farms	Cows per farm	Cows per Man	Acres of crops per man	Cwt. milk per Cow	Cwt. milk per Man	Capital (000)	Productive man-work units per farm	Productive man-work units per man	Crop index	Labor income
Less than 6.5	17	4.5	3.5	31	70	254	$ 11	188	150	94	$ 136
6.5 to 10.4	18	7.9	5.6	64	50	274	17	268	185	115	-23
10.5 or more	16	13.4	8.9	50	46	423	15	344	229	87	-163

Size of herd in relation to milk costs and returns:

Associated with increased herd size was a reduction in the hours of labor and other non-feed costs per cow (Table 28). This was the result of more efficient use of labor and the distribution of the relatively fixed costs associated with milk production over more cows, reducing the average amount to be borne by each. However, as herd size increased among these farms from those having less than 6.5 cows to those that had 10.5 or more, milk production decreased nearly 2400 pounds per cow. This reduced production was not necessarily caused by increased herd size but was evidently the result of poorer cows.

With an increase in herd size the amount of man labor used per year decreased from 184 to 114 hours per cow, or by 38 percent. Meanwhile, other costs except feed decreased by 36 percent and pounds of concentrates fed per cow decreased 8 percent. The decreases in milk production and sales practically offset the savings in labor and other costs to the extent that increasing the size of herd from less than 6.5 cows to an average of 10.5 or more for the year was associated with increased profits of less than $1 per head.

Table 28

Relationship of Size of Dairy Herd
to Costs and Returns in Producing Milk

Cows per farm	Farms	Cows per farm	Average per cow: Pounds milk produced	Pounds concentrates fed	Man labor: Hours	Man labor: Cost	Costs except feed and Labor	Net total Costs	Net Profit
Less than 6.5	17	4.5	7,026	2,529	184	$ 166.75	$67.67	$236.34	$-55.80
6.5 to 10.4	18	7.9	5,014	2,918	150	124.83	59.44	226.21	-86.98
10.5 or more	17	13.7	4,632	2,323	114	105.45	43.02	164.32	-54.94

Between those farms with herds of less than 6.5 and those keeping 6.5 to 10.4 cows, labor requirements were reduced 34 man hours per cow for the year, or by 18.5 percent, despite an increase of 389 pounds, or 13.4 percent, in the amount of concentrates fed per cow. In spite of the increased feeding of concentrates, milk production declined more than 2000 pounds per cow. The average price received for milk also decreased 15 cents per hundredweight. These factors combined to cause a lower net profit from the production of milk on the farms with 6.5 to 10.4 cows, relative to the smaller herds, than was offset by their increased labor efficiency and reduced costs except feed and labor.

Farms whose herds averaged 10.5 or more cows for the year had lower costs of production than did those with either small or medium-sized herds. However, their reduced production and milk sales per cow somewhat counterbalanced the decreased costs in comparison with the small-size herds. Lower feed costs combined with economies of labor and other non-feed costs gave the largest-sized herds an average advantage in net profit amounting to $32 per cow over the medium-sized herds.

Increasing the herd size did not automatically increase profits. If poorer cows or poorer care for the herd were associated with increased herd size negative profits resulted. A farm business that earned a profit might increase its return by increasing its size if the relationships between the productive factors remained constant or continued favorable.

In the analysis of the dairy enterprise on these farms, it was significant that economies of labor and other non-feed costs accomplished by increased size of herd made it possible to operate the larger herds at about the same rate of profit per cow as the smaller herds, (those averaging 10.5 or more cows for the year compared with those of less than 6.5), although the smaller herds had over 50 percent higher milk production per cow. The larger herds were found mostly on the larger farms whereon the proportion of crop to livestock (particularly dairy) business was greater and the emphasis on intensification of dairy production was less than on the farms that had the smaller herds. This was consistent with the contention stated earlier that the production and sale of manufacture-milk on the larger farms represented a side-line business.

At the prices current for milk these economies in non-feed costs were equivalent to 2550 pounds of milk production per cow. The actual decrease in milk output between the two groups was slightly less than 2400 pounds per cow. The discrepancy was probably due to a difference in quality of cows and to the difference found in feeding rates.

Operators of the larger crop farms in this study were able to achieve economies in the cost of dairy operation equivalent to a substantial increase in milk production per cow. This was accomplished

without a corresponding increase in the investment per cow that would have been required to provide a high producing animal, and with lower feed input per cow, so that their net profits per cow compared favorably with those of their neighbors who got higher rates of milk flow. Whether this equality of net income rate was apparent in the total farm business depended upon the relative profitability of the other enterprises that were combined with the dairy.

Total milk production:

In a study of farms that have dairying as their major enterprise, total milk production is a useful measure of size of business. It was not so valuable among the manufacture-milk producers in northeastern Oklahoma. Increased milk production per farm resulted from either better cows or enlarged herds. Therefore, grouping the farm by total milk production placed the commercial producer in the same group with the side-line dairyman whose primary interest was crop production. Furthermore, the percentage of milk sold varied greatly between farms, especially between the commercial dairies and the general farms. Also, total milk production measured only that portion of the farm business represented by the dairy, ignoring the remaining farm enterprises which were of importance to many of the farms under study.

Increases in total milk production were not accompanied by consistent or proportional changes in other measures of size of farm business (Table 29). Acreage per farm increased then decreased as more milk was produced. The small and large-size farms had higher crop-pasture land ratios, denoting their greater emphasis on dairy, than did the medium-size farms. Farms with the greatest total milk production did not have as large capital investments nor as many men

per farm as did the medium-size group.

Table 29

Relation of Total Milk Production to Other Measures of Size of Farm Business

Pounds of milk produced per farm	Farms	Acres per farm: Total farm	Crop-land	Past-ure	Cows per farm	Productive man-work units	Milk pro-duced (000) lbs.	Num-ber of men	Capi-tal (000)
Less than 31,000	15	116	45	54	5.6	187	23	1.2	$ 12
31,000 to 50,999	18	191	88	81	7.6	280	38	1.5	15
51,000 or more	18	154	67	82	11.9	314	67	1.4	14

Farms with over 51,000 pounds milk production had the highest average production index of any group of farms in this comparison (Table 30). Work units per man, or labor efficiency, also increased by about one-fifth in each of the size-groups. These two factors caused labor income to increase consistently through the size-groups.

Table 30

Relation of Total Milk Production per Farm to Rates of Production and Measures of Total Farm Income

Pounds of milk produced per farm	Work units per man	Pounds milk per cow	Production index: Crops	Live-stock	Farm	Income to capi-tal and operator's labor	Labor income
Less than 31,000	149	4,107	86	97	98	$ 383	$ -219
31,000 to 50,999	184	5,000	112	101	96	628	-142
51,000 or more	228	5,670	112	116	116	1,005	287

Labor Efficiency

As a man works more days of the year he expects to earn a bigger yearly income. This is not always the case however, for in some instances a man may pay the enterprise and work for it rather than the

enterprise working for the man, if his labor is unproductive or wasted; i.e., if it is not directly associated with more product.

Relation of work units per man to total labor income:

In general, farms not utilizing their labor efficiently were the least successful of any farms in the study (Table 31). As productive work accomplished per man increased by about 1.3 times, labor income increased $1851 per farm or $11.86 per additional work unit per man. This was the strongest response found between any management factor analyzed and labor income.

Labor costs constituted about one-half of the total cost of farming. For financial success labor must therefore be used for production. Productive-man-work units did not denote the number of 10-hour days a man worked; they represented the average amount of productive work that was accomplished on the farms under study. A man may work many more days and fail to get as much done as his neighbors because he works less efficiently. In general, farms that had higher labor efficiency had more productive work to be done.

Rates of production declined as the farms used their labor more efficiently. If production rates had remained constant at the levels attained by farms with the poorer labor efficiency, the average labor income would have increased even more.

Table 31

Relation of Labor Efficiency to Labor Income

Work units per man	Farms	Cows per farm	Productive-man-work units Per farm	Productive-man-work units per man	Men	Production index	Return to capital and operator's time	Labor income	Percent return on capital
Less than 150	16	5.8	167	118	1.4	115	$ -348	$ -920	-17.7
150 to 229	18	8.3	245	178	1.4	105	553	-102	-11.7
230 or more	17	11.2	378	274	1.4	93	1,808	931	2.4

Total-farm milk output per man:

Dairying was not the whole farm business. It accounted for less than one-half of the total amount of directly productive effort on 26 of the 52 farms included in the study. Milk output per man would be expected to show less response in total farm income than would the amount of all productive work accomplished per man, because variations in non-dairy activities partly obscured the dairy results. Yet, an important measure of the effectiveness with which labor was utilized on the dairy farm was the amount of milk production achieved per man. More milk production per man was the result of handling more or better cows without a corresponding increase in the size of the labor force. It was associated with increased labor income per farm (Tables 32 and 33).

This was achieved without marked increases in size of the total farm business except cows, and without an increase in average capital investment, but by a marked increase in the proportion of work units on cows and a slight improvement in milk yield per cow. From the standpoint of the total farm, not all of the income-result was due to greater emphasis on dairy, however, because the total-farm production index increased consistently, though coincidentally, with milk output per

man. The combination of dairy emphasis and improved production resulted in more than $900 increase in labor income per farm between the farms of less than 25 and those of 40 or more thousandweight of milk per man.

The response in the dairy enterprise itself was a little more clear-cut, being free from interference by other parts of the business (Table 33). The increased number of cows per man was associated with a marked reduction in man hours per cow with little change in pounds of milk per cow between the first two groups of farms. The greater economy of operation was resulted in an increase of 13 cents per hour, or $11 per cow, in the wages earned in dairying. Between the last two groups, man hours per cow were reduced relatively little, but the extra milk flow and larger number of cows per man further increased the net wages earned from dairying by 39 cents per man-hour, or by nearly $50 per cow. On a herd of 10 cows this would amount to $500 per farm.

With labor so costly as it was on these farms and with the general average of farm incomes none too high, it was important even with a side-line dairy to see to it either that dairy labor was economized in order to produce more of the profitable crops that could be grown, or that the dairy itself was sufficiently productive to return satisfactory wages for the effort expended on it.

Table 32

Relation of Amount of Milk Production per Man Equivalent to Various Total-Farm Factors

Thousandweight of milk per man			Cows	Productive-man-work Units		Capital	Production	Labor
Range	Average	Farms	per farm	Per farm	Per man	(000)	index	income
Less than 25	18	19	6.1	234	152	$ 14	90	$ -423
25 to 39	31	17	9.2	288	215	15	105	-22
40 or more	54	15	10.8	278	219	13	120	514

Table 33

Relation of Amount of Milk Production per Man Equivalent to Various Factors for the Dariy Enterprise

Thousandweight of milk per man	Percent of work units on cows	Pounds milk per cow	Cows per man	Man-hours per cow	Return per hour man labor on cows
Less than 25	39	4,577	4.0	167	$0.17
25 to 39	48	4,513	6.9	131	..30
40 or more	58	6,272	8.5	129	.69

Production Rates

Agricultural products are in general homogeneous and sold through purely competitive markets. The typical farmer does not produce enough of the total output to influence the price received for his product although by timely marketing and grading he may receive a seasonally higher price. Nevertheless, farmers are obliged to sell at the market price set by supply, demand, the collective strength of the buyers, and possibly governmental support or ceilings. Under these conditions increased production is profitable if it may be attained at a decreased, identical, or increased cost per unit if the increase in cost of the last unit of output does not exceed the costs of production for that unit.

Milk production per cow in relation to total farm income:

As total milk production per cow increased, average labor incomes also increased (Table 34). In general, cows with high production rates were located on farms having low capital investments and small herds. However, when compared on the basis of work units, they were almost identical in size to those having medium rates of production.

Increased milk production per cow caused an increase in the total-farm production index, other factors declining in magnitude. This increase in production was sufficient to offset the effect of decreased labor efficiency and smaller herd size.

Farms that produced less than 45 hundredweight of milk per cow, having the largest capital investments and the largest herds, were relatively efficient in their use of labor. Poor rates of production were the major cause of their reduced labor incomes. Production rates only three-fourths as high as those of the neighbors could not be expected to return equal profit. Small farms that emphasized dairy,

attained high production rates, and supplemented their businesses with off-farm sources of income were more profitable. If the larger farms had achieved these same high rates of production and retained their labor efficiency, they conceivably could have earned labor incomes much greater than those of the higher-producing smaller farms.

Table 34

Relation of Milk Production per Cow to Total Farm Income

Hundredweight of milk produced per cow	Farms	Cows per farm	Pounds of milk per cow	Productive-man-work units Per farm	Per man	Acres of crops per farm	Crop index 1/	Production index	Capital (000)	Labor Income
Less than 45	19	10.5	3,631	309	210	79	100	77	$ 17	$-414
45 to 59	15	8.6	5,132	256	178	68	90	108	14	-394
60 or more	17	6.2	8,193	254	177	55	111	130	11	769

1/ Farms with 20 or more acres of crops.

With decreasing size of herd associated with increased milk production per cow, the relative importance of crop acreages and their yields became more pronounced. Acres of crops per cow increased as farms were found that had progressively higher rates of milk production per cow. In the group that had about average milk yield (45 to 59 hundredweight) per cow, crop yields dropped to 10 percent below the average for all farms. The average labor income remained relatively low in spite of increased milk production, because of low crop yields. In the group that produced 60 or more hundredweight of milk per cow, crop yields were up to 11 percent above the all-farm average. The combination of better crop yields and better milk yields with about equal size of productive business (total work units) and labor efficiency (work units per man), gave these farms a decided income advantage ($1164

per farm) over those whose milk production rates were equal to only about the average for all farms. It was easily possible for the crop side of the business to nullify the effect of the dairy, but when both alike were good, total-farm incomes were remarkably improved.

Milk production per cow in relation to milk costs and returns:

Increased milk production per cow was related to higher dairy profits in this study (Table 35). Operators that attained high levels of milk production were able to produce at lower costs per hundredweight than were the farms whose rates of production per cow were lower. The lower cost was the result of increased labor and feed efficiency. Being utilized in work associated with more product, more of the labor was directly productive, and the increased rate of feeding was assimilated by the cow in the production of milk and not in physical maintenance alone. This was a significant point, for although the operators did influence price through their seasonality of production and milk-fat test, the variation in price received was not as influential in affecting profit as was the variation in the costs of production.

In the process of milk production, as in the production of any goods, basic minimum costs must be met whether there are 5 or 20 cows in the herd capable of producing 3000 or 10,000 pounds of milk in a lactation period. Between those farms producing less than 4500 and those attaining a production of 6000 or more pounds of milk per cow, profit increased from $-3.47 to $-0.03 per hundredweight. This exemplified the principle that better utilization of the factors of production was profitable if the returns exceeded the additional cost required to achieve the higher rate of production.

More feed and labor were required, and the net cost was greater,

to keep the higher-producing cows than to keep those of lower production. Part of the increases in labor and in costs except feed and labor were due to decreased size of herd (Table 28), but the additional feed was probably required for the greater milk production. In each case, however, the increase in production outran the increase in costs, so that the inputs per 100 pounds of milk declined (Table 35). For production beyond 6000 pounds per cow, some evidence was found of improved quality of cows, for production increased out of proportion to costs and the concentrate-feed consumption per 100 pounds of milk declined.

Despite the adverse effect of reduced size of herd and attendant increase in labor requirement per cow, increased milk production per cow was associated with increased rate of return per hour of labor on cows. Better production tended to increase dairy profit, but it was hampered by the reduced efficiency resulting from smaller scale of operation and could be completely obscured in the total farm business by the behavior of non-dairy enterprises.

Table 35

Relation of Milk Produced per cow to Costs and Returns

Hundredweight of milk produced per cow	Average per cow			Average per 100 pounds of milk					Return per hour of man labor on cows
	Net cost	Concentrate feeds, pounds	Man hours	Concentrate feeds pounds	Man hours	Costs except feed and labor	Net cost	Price received	
Less than 45	$180	1,948	120	54	3.3	$1.91	$7.01	$3.55	$0.22
45 to 59	215	3,042	144	59	2.8	1.36	6.10	3.47	.28
60 or more	225	3,292	172	40	2.1	1.02	3.41	3.38	.73

Relation of Pounds Concentrates fed per Cow to Milk Costs and Returns.

As would be expected when the pounds of concentrates fed per cow were increased among these farms, milk production per cow also increased (Table 36). This was not significant in itself, for the farm operator was interested in knowing whether the increased rate of feeding was profitable. It was previously pointed out that the farms in this study were dairying without benefit of silos. Therefore, milk production could be increased through the rate of feeding only by changes in the use of concentrates, dry roughages, or pastures.

Milk production did not increase in proportion to the increase in concentrates fed. This was not an unusual phenomenon. The biological and physical limitations of the producing unit, the cow, effectively limited the range wherein milk production increased in proportion to feed increases. This range apparently occurred at a relatively low feeding rate. Nevertheless, as the feeding rate increased, pounds milk produced per pound of concentrate declined from 3.1 to 2.0, to 1.6 for the respective groups of farms. Hours of man labor per cow first decreased as more concentrates were fed then increased considerably. This unusual response to more work, which usually accompanies higher feeding rates, was the result of a decrease in labor on cows that was not directly associated with milk production, i.e., "waste" labor.

The high costs of dry concentrates and subsequent need for more labor to handle more feed and milk per cow caused return per hour of man labor to be only $0.35 on farms feeding 3030 or more pounds of concentrate. This was in contrast to $0.51 per hour of labor on both groups of farms feeding less than 3030 pounds of concentrates. Increasing the rate of concentrate feeding did not cause milk production to

increase sufficiently to pay for the additional man labor.

Concentrate feeds were costly. If succulent feeds had been available and the dairymen had supplemented them with concentrates it is concievable that less concentrates would have been necessary to achieve the same rate of milk production. To pay for increased feeding rates, milk production must respond very favorably. The cows in this study were evidently unable to assimilate the additional concentrate feed quite so efficiently for conversion into milk. Hence, farms with high concentrate feeding rates were not fully repaid for their efforts.

Table 36

Relationship of Pounds of Concentrates Fed per Cow to Milk Production, Costs, and Returns

		Average per cow						
			Pounds		Total feed		Average per hundredweight of milk sold		Return per hour of man labor
Pounds of concentrates fed per cow	Farms	Cows per farm	Milk produced	Concentrates fed	and pasture costs	Hours of man labor	Net costs	Profit	
Less than 2,100	18	9.3	4,128	1,335	$ 70	132	$5.16	$-1.70	$0.51
2,100 to 3,029	17	8.7	4,905	2,488	106	121	5.26	-1.77	.51
3,030 or more	17	8.0	6.503	4,097	170	163	5.11	-1.68	.35

Whereas increased concentrate-feeding rates appeared to be uneconomical, nothing was indicated as to the possibilities with improved pastures, legume hays, and silage. Such relationships were unavailable to the study because of the absence of these practices among the farms that produced milk for manufacture.

Relation of crop index to total farm income:

In general, crop yields were directly related to labor income (Table 37). This was not surprising in itself, for farm operators

realized that good crop yields were generally more profitable than poor yields. The significance of the statement lay in the fact that the two groups of farms included in the analysis were comparable in geographic size, capital investments and total work-units, although the poor-yield farms were slightly larger and had more cropland..

Farms with high crop yields usually had high rates of livestock production as well. High yields on these farms exerted enough positive influence to overcome the negative effect of the slight decrease in labor efficiency demonstrated by the decline in work units per man between the two groups.

The major difference between the two groups of farms was their efficiency of production. The results of the analysis substantiate the fact that if a farm had poor yields, whatever the cause, income was reduced. This was the result of the relatively stable basic costs associated with the production of farm products that were not proportionately affected by yields or other measures of production.

Instances were found where the costs of yields were greater than the return, but reduction in profits caused by the cost of excessive yields did not occur as frequently as did profit reduction as a result of poor yields.

High rates of production on small acreages cannot be considered of equal effect to their counterpart on farms having larger acreages. The two groups for this analysis had approximately equal acreages and capital investments.

Table 37

Relation of Crop Yields to Various Factors

Crop-yield index	Farms	Cows per farm	Pounds milk produced per cow	Production index: Farm	Production index: Crop	Production index: Livestock	Acres crops per farm	Productive-man-work units: per farm	Productive-man-work units: per man	Capital (000)	Labor income
Less than 96	18	9.0	4,460	88	72	96	102	294	204	$ 17	$-216
96 or more	17	9.4	5,329	111	118	110	90	283	194	16	225
None 1/	16	6.9	5,982	-	-	110	7	213	169	8	-68

1/ Crop-yield index used only on farms with more than 20 acres of crops.

Not all of the difference in income between the low-yield and the high-yield groups was due to improved crop yields, for livestock rates of production also were improved. With about the same average size of herd, milk production per cow was 869 pounds, or 19 percent, higher on the farms having the better crop yields. Farms not having more than 20 acres of crops, of whom one-half had none, were relatively small businesses, with only about one-half the average capital investment of the other farms. Neither losses nor gains could range very widely. With relatively good livestock output their labor incomes represented smaller losses than those of the larger farms with relatively low crop yields.

Total-farm production index:

In this study, production rates for the farm as a whole were measured by production index. This combined the crop yields and rates of livestock production in proportion to the productive-man-work units represented by each enterprise, expressing the result as a percentage of the average of all farms included in the study. Increased labor income was associated with increased production index (Table 38).

High production rates are not always profitable but without production an operating profit is impossible.

Production rates on 17 farms were less than 85 percent of the average for all farms. These were the large farms in this analysis, in terms of capital structure, total work units, and size of herd. However, they attained the lowest production per cow and had relatively poor utilization of the labor force. These farms averaged $-553 labor income.

Between farms having a production index of less than 85 and those with production index 85 to 114, labor was used more efficiently and more milk was produced per cow. The productive size of the business was about the same, but the average capital investment was $3 thousand less per farm. Increased capital investment without better production, greater efficiency, or a bigger business is of little financial advantage to the operation of a farm. Labor incomes increased to $-138 per farm.

Between farms having a production index of 85 to 114 and those with production index 115 or more, size of business declined further and labor efficiency dropped to a point as low as it was on the farms with production index less than 85. In spite of these disadvantages, labor incomes increased $795 per farm between these two groups because of the tremendous increase in production rates and another $3-thousand reduction in the amount of capital required per farm. Economical increase in production rates for the whole farm constituted a powerful force for increasing the farm income.

Table 38

Relation of Production Index to Various Factors

Production index	Farms	Cows per Farm	Pounds milk produced per cow	Productive-man-work units per farm	Productive-man-work units per man	Production index	Capital (000)	Labor income
Less than 85	17	10.0	3,498	292	169	72	$ 17	$-553
85 to 114	18	8.8	4,987	284	208	98	14	-138
115 or more	17	6.3	8,075	202	164	136	11	657

Combination of Enterprises

Farm businesses are often composed of one major enterprise and one or more minor enterprises that are complementary in nature and designed to utilize feed, labor, or other resources that otherwise would not be fully utilized. In a region having few farming alternatives or a region in which one type of farming has proven quite successful, the farm operator has little difficulty in choosing his major and complementary enterprises. This is not always the case in a general farming region that presents the possibility of various farm enterprises in addition to off-farm labor, especially if the alternatives include no outstanding profit opportunity.

Northeastern Oklahoma was an area that offered various alternatives to farm operators. The result was that farm income was usually a composite earned from several sources. The usual alternatives for emphasis among the manufacture-milk farms were dairy, crops, and off-farm sources of income. Analysis previously reported indicated that the larger crop farms with yields average or better were relatively profitable, but did not disclose the most profitable proportions of dairying or outside income, nor the conditions most appropriate for their emphasis.

Proportion of the business represented by dairy:

Among farms characterized by emphasis upon dairying, it might be expected that increases in the percent of total business receipts that were derived from milk sales would result in increases in farm income. For the farms included in this study, the side-line nature of the dairy enterprise proved the reverse to be true (Table 39).

Increases in percent of receipts from milk were associated with

progressive declines in crop acreages per farm. This was reflected in marked declines in total work units and total capital investment. The reduced size of business brought reduced labor efficiency. Increases in milk production per cow and in crop yields were not sufficient to overcome the handicaps of smaller size and lower labor efficiency.

When the farms were grouped by percentage of total productive-man-work units represented by cows, essentially the same relationship was disclosed, but to a smaller degree (Table 40). The chief difference was that neither gross receipts nor net income bore ratios to productive-man-work units that were equal on all enterprises.

Increased percentage of work units on cows was associated with reduced crop acreages and reduced amounts of work done off the farm for income. Apparently, both crops and off-farm work paid better per man-work unit than did cows producing manufacture-milk.

Increases in herd size were partly responsible for the increased percentage of work units on cows. These were accompanied by decreased milk production per cow, which tended to offset the advantage of increased crop yields. When these applied to reduced acreages and the additional cows reduced the opportunity to do off-farm work for income, the average yearly labor income for the total business--farm and off-farm--declined.

Table 39

Relation of Percent of Total Receipts from Milk Sales to Farm Income

Percent of total receipts derived from milk sales	Farms	Cows per farm	Pounds of milk per cow	Percent receipts milk sales	Acres crops per farm	Crop index	Productive-man-work units Per farm	Per man	Capital (000)	Labor income
Less than 25	16	8.4	4,670	17	91	100	311	213	$17	$ 630
25 to 34	17	7.5	5,942	29	81	96	264	196	14	129
35 or more	18	9.1	5,049	52	35	104	208	160	11	-722

Table 40

Relation of Percent of Work Units on Cows to Farm Income

Percent of man-work units on cows	Farms	Number of cows	Pounds of milk per cow	Labor and machine use income	Acres crops per farm	Crop index	Productive-man-work units Per farm	per man	Capital (000)	Labor income
Less than 45	19	4.3	5,749	$845	83	87	306	201	$15	$ 307
45 to 59	14	6.8	4,945	495	85	110	285	197	15	211
60 or more	18	7.9	4,925	27	39	106	206	169	12	-527

Relation of off-farm labor and machine use to total farm income:

Farms having no employment off the farm represented the large businesses in terms of herd-size, acreage, and capital investments (Tables 41 and 42). Production index declined between farms having no off-farm employment and those whose operator's held regular jobs. This relationship also existed between farms whose operators were regularly employed off the farm and operators with occasional off-farm employment.

The group of farms whose operators held regular jobs attained the highest labor efficiency of the three groups. Farms having occasional off-farm work made the poorest use of their labor. Pay earned during the year by operators regularly employed at off-farm work averaged $1885. Operators occasionally employed averaged only $289 for their off-farm work. This reduction in income plus an increase in machinery expenses per work unit and a larger capital structure upon which interest must be paid had an adverse effect upon labor income between the two groups.

The type of work performed off-farm differed between those operators who were regularly employed and those who were only occasionally employed. The work usually performed by the occasionally-employed operators consisted of custom machine-use, usually hay baling, combining, hauling, or mowing, whereas operators regularly employed worked at jobs requiring only direct man labor.

Farms that did not provide their operators with enough productive work might be intensified by labor or custom machine-use off the farm. The return for such work depended partially upon the skills or machinery of the farmer and the demand in the surrounding area for his labor or the use of his machinery.

A farm business that did not provide a full year of productive work for its operator could not in itself be very successful. Farm operators that attempted to intensify their businesses through custom machine-work failed to increase their receipts and productive work sufficiently to cover the additional machinery expenses and supplement their farm business sufficiently to earn positive labor incomes. Those working at regular jobs returned the highest average labor income

of the three groups. Such opportunities were especially important to the farms with small capital investments, on which the operator had to depend to a greater extent upon his own labor as a source of income.

Table 41

Relation of Off-Farm Labor and Machine Use to Total Farm Income

Off-farm income	Farms	Cows per farm	Milk per cow	Labor and machine use off farm	Productive-man-work units Per farm	Per man	Production index	Return to operator's labor and capital	Labor income	Capital (000)
None	26	9.4	5,096	-	262	193	108	$894	$ 71	$16
Regular	10	7.7	5,371	$1,885	311	205	105	775	269	10
Occasional	16	7.6	5,250	289	240	176	96	314	-324	13

Table 42

Relation of Type of Farm to Off-Farm Labor and Machine Use.

Off-farm income	Acres per farm			Machine expense per man-work unit	Percent of man-work units			
	Total crop		Pasture		Cows	Other livestock	Crops	Off-farm
None	181	82	90	$2.66	53.7	23.0	23.3	-
Regular	112	27	56	1.95	45.3	4.1	5.9	44.7
Occasional	144	72	58	3.27	47.5	18.9	23.5	10.1

SUMMARY

For 52 manufacture-milk dairies of northeastern Oklahoma in 1950, the average income to pay for the use of capital and operator's labor was $1015. The average labor income, or the amount left to pay the operator for his year's work after all operating expenses had been paid and interest on the capital investment had been deducted, was $263. Labor earnings, which included the use of the operator's house and value of farm products used by the household, averaged $845 per farm.

The sale of milk accounted for 26.8 percent of the farm income. Other income earned through the dairy enterprise, mainly growth in the value of animals, brought the total from dairy to 43.0 percent of total farm receipts. Other livestock and crop sales shared about equally in another 43.2 percent of the farm income. The dairy enterprise was the largest single source of receipts but was clearly rivaled by the combination of crop and other livestock enterprises. Miscellaneous receipts, mostly labor and machine-use off the farm, were equal to about one-half of the value of the milk sales.

The period of the survey was generally favorable from the standpoint of the ratio of prices received to prices paid by the farmers. Increased demand associated with the Korean War gave the nation's economy a series of rising prices and cut short the recession that appeared to be beginning in 1949.

Weather conditions were approximately normal in May and June, but

during the months of July and August, rainfall was 44.5 percent above normal and temperatures were 10.2 percent below normal. These relatively cool, moist conditions prolonged the effectiveness of pastures in 1950 as compared with other years.

The most important factors affecting farm income that the farm operator could control were the efficient use of labor, the attainment of high rates of production, and on the small-acreage farms, regular off-farm employment. Labor costs constituted about one-half the total cost of farming. A farm that failed to use its labor force efficiently, mainly for direct production, was not generally financially successful. The efficient use of labor was directly related to the size of business. The larger farms made the best use of their labor.

In conflict with the advantages of improved labor efficiency, the general average of farm production rates declined with increased size of business. Crop yields appeared to hold up better with increased crop acreages than did milk production per cow with increased size of herd. Wherever increased production could be tested without differences in size of business and labor efficiency, improved farm incomes resulted, except that when increased milk production per cow was induced by relatively heavy rates of concentrate feeding it appeared to be uneconomical.

Farms selling manufacture milk represented two somewhat different sub-types of farming, although not always clearly distinguishable in the area of differentiation. The small-acreage farm relied on dairy as a means of intensifying its business and using the farm to the best advantage. Such farms used most of their land for pasture and many of them had no crops at all. The operators relied upon the purchase of concentrates and some roughages, particularly prairie hay, for dairy

feed. In general, the higher-producing cows were located on these farms. Though small in the total-farm sense, these were the most nearly commercialized dairies in the study of manufacture-milk farms.

Operators that included in their businesses off-farm labor at regular jobs made higher labor incomes than their neighbors. Otherwise the farm business did not fully utilize the available labor force and rates of milk and crop production did not generally increase sufficiently to offset the disadvantage. Low labor efficiency, with production rates not exceeding those of other small farms whose operators had regular off-farm employment, combined to reduce the labor income to a very low level.

The other type of farming encountered was represented by farms with the larger acreages. Dairying on these farms was considered a complementary enterprise to the rest of the business. As such, the side-line dairyman was generally more successful than the average if he had good crop yields, was efficient in the production of other livestock, and made efficient use of his labor force. The effect of size of business upon costs was evident. Labor efficiency on dairy, measured as milk produced per man equivalent, was higher on the larger than on the smaller farms, despite a lower milk production per cow. This was the result of more productive work to be done. In general farms of larger acreages, having the larger proportion of the farm in crops, returned higher labor incomes to their operators if labor was used efficiently and if average or better rates of production were attained.

In this study no evidence was found to indicate the results that could have been obtained had silage, leguminous hays, and improved pastures been used for milk production. The use of these feeds,

generally associated with relatively high milk production per cow, was not common to farms producing manufacture-milk. Silage was used on only one farm and leguminous hays were not the prevalent dry roughages fed. Practically all of the pasture was unimproved native grassland.

The year of the study was favorable for manufacture-milk production from two aspects. Good weather conditions prolonged the pasture season and the producers enjoyed a favorable milk-feed price ratio. Nonetheless, farm financial success was associated with additional enterprises that were supplemented by dairying. These additional enterprises occurred in the form of increased crop acreages on the larger farms and regular off-farm labor on the smaller businesses. The farm businesses that relied mainly on commercial manufacture-milk production for the major portion of their incomes were generally not so profitable.

The implications of these results were several. Less favorable pasture conditions than those in the year of the study would tend to increase the cost of milk production. Unless other prices and costs declined in proportion, reduced milk prices, such as occurred in certain years after 1950, also would tend to reduce dairy profits. Since manufacture-milk dairying was not outstandingly profitable relative to the alternatives in the comparatively favorable year of the study, it would not likely be expected to increase in importance on these same farms under normally changing conditions in the near future. Maintenance or increase in the status of the industry might be dependent upon conversion of additional general farms from cream to milk selling or from other livestock to dairying, depending on labor resources.

For these farms, the longrun alternatives appeared to be two in

number, capable of either separate or simultaneous development, probably the latter. These were enlargement in size and conversion to A-grade milk production. Data in this study pointed to the enlargement possibility, with increased crop acreage per farm. This move would permit more economical crop production through the selection of the larger, more productive lands for the purpose and through economies of scale. Concomitant enlargement of pasture acreages would encourage more livestock production per farm. Consolidation of both acreage and capital would be required.

For those who, because of resources and inclination, would remain in dairying, the second alternative was signaled by the presence of dairy-general farms producing A-grade milk in the area. Expanding markets and the growing necessity for the adoption of economizing-technology in the farming business would dictate such a move.

Alternatives for the displaced farmers would be dependent on non-farm industry, already combined with agricultural production in many instances. Part-time agricultural-industrial "farming" would continue in vogue during the process of adjustment.

Severe depression or total war could respectively retard or accelerate these anticipated movements.

BIBLIOGRAPHY

1. Anderson, A.C. and A.W. Goke. Soil Survey of Craig County, Oklahoma. United States Department of Agriculture, Bureau of Chemistry and Soils Bulletin 24, Series 1931.

2. Benedict, J.D. History of Muskogee and Northeastern Oklahoma. Vol. 1. S.J. Clark Publishing Company. 1922.

3. Doll, R.J. and E.N. Castle. Financing Agriculture Through Commercial Banks. Federal Reserve Bank of Kansas City. April 1954.

4. Efferson, N.J. Principles of Farm Management. McGraw-Hill Inc. 1953.

5. Kaho, Noel. The Will Rodgers Country. University of Oklahoma Press. 1941.

6. Layton, M.H. and O.H. Brensing. Soil Survey of Mayes County, Oklahoma. United States Department of Agriculture, Bureau of Chemistry and Soils Bulletin 19, series 1932.

7. Misner, E.G. Financial Returns and Costs on 100 Farms With Registered Purebred Holsteins, Year Ended April 30, 1952. Cornell University Agricultural Experiment Station Bulletin 931. September 1953.

8. Underwood, F.L. An Economic Study of Dairy Farming in the Roanoke Area in 1939-1940. Virginia Agricultural Experiment Station Technical Bulletin 88. July 1943.

9. Underwood, F.L. Flue Cured Tobacco Farm Management. Virginia Agricultural Experiment Station Technical Bulletin 64. January 1939.

10. Vernon, J.J. Why Some Farms Are More Successful Than Others. Virginia Agricultural Experiment Station Bulletin 341. July, 1942.

11. Wright, M.H. The Story of Oklahoma. Webb Publishing Co., Oklahoma City. 1929.

VITA

John Russell King
candidate for the degree of
Master of Science

Thesis: SOME OF THE CAUSES OF DIFFERENCES IN INCOME AMONG FARMS PRODUCING MILK FOR MANUFACTURE IN NORTHEASTERN OKLAHOMA, 1950.

Major: Agricultural Economics

Biographical:

Born: The writer was born at Bartlesville, Oklahoma, September 26, 1929.

Undergraduate Study: He attended grade school at Dewey, Oklahoma, and was graduated from the Dewey High School in 1947. In the fall of 1947, he entered Oklahoma Agricultural and Mechanical College from which he received the Bachelor of Science Degree in Agriculture in May, 1951.

Graduate Study: Oklahoma Agricultural and Mechanical College, 1953-1954.

Date of Final Examination: August, 1954.

THESIS TITLE: SOME OF THE CAUSES OF DIFFERENCES IN INCOME AMONG FARMS PRODUCING MILK FOR MANUFACTURE IN NORTHEASTERN OKLAHOMA, 1950

AUTHOR: John Russell King

THESIS ADVISER: Dr. F. L. Underwood

The content and form have been checked and approved by the author and thesis adviser. The Graduate School Office assumes no responsibility for errors either in form or content. The copies are sent to the bindery just as they are approved by the author and faculty adviser.

TYPIST: Mrs. Jan Toney