CHANGES IN THE COST OF PRODUCING WHEAT

IN GARFIELD COUNTY, OKLAHOMA

FROM 1910 TO 1956

By

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PREFACE

The objective of this thesis is to determine the cost of producing wheat for a specified area and method of farming. The conditions under which wheat is grown in this area are described in considerable detail. Thus it is possible to compare the costs in this area with production expenses in other regions.

The cost of wheat production was also computed by allocating total farm expenses to the wheat enterprise. Farm account methods indicate the effectiveness of other enterprises in lowering wheat production costs. A comparison of expenses computed by different methods shows how actual farm expenses compare with theoretical costs.

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CHAPTER I

INTRODUCTION

Many technological innovations have been adopted in the wheat far-
ming industry since 1910. Tractors have replaced horses. Wheat farmers
can now plow with a five-bottom plow faster and deeper than they used to
with a two-bottom. The combine has replaced the binder and the threshing
machine, and the truck has replaced the team and wagon. Improved wheat
varieties are now used. In recent years commercial fertilizers and chemi-
cals for controlling weeds and insects have been available to farmers.

There is, however, lack of evidence on how the cost of producing
wheat has been influenced by these technological developments. The use
of more efficient machinery, better varieties, and substitution of ma-
chinery for labor, tend to reduce the real cost of production. On the
other hand, increased prices of machinery, land, and labor have a ten-
dency to increase the cost of production.

Many groups in our economy are interested in learning how various
technological developments have influenced the cost of producing wheat.
For example, agencies interested in parity price programs would like to
know how the real cost of production has changed from the base period
to the present.

In this thesis the cost of producing wheat in Garfield County is
computed for the periods 1910 - 1914, 1930 - 1932, 1939 - 1941, and 1953
- 1956. Cost figures for 1920 and 1931 were obtained from other studies.
Changes in these costs are determined and the factors causing these

changes are described. Different methods of arriving at a cost estimate are used and the results are compared. Other cost studies are presented to show the different methods of making cost estimates and to compare their results with the results obtained in this study.

Problems Involved in a Cost Study

According to economic theory, the most profitable rate of output for the firm is where marginal cost equals marginal revenue. To illustrate, assume a farm with an average cost curve SAC_1 (Figure 1). The farm's cost curve is of this particular shape because with a given organization there is a level of production at which it can operate at minimum costs.

The marginal cost curve will have the relationship to the average cost curve shown in Figure 1. With a price of $1.00 the farm will tend to operate at the output X_1 where price equals marginal cost. It will produce this output at an average cost of $0.60. If the price increases to $1.50 it will produce at a level X_2 and produce this output at an average cost of $0.70. Thus the increased wheat price has increased production and caused the farmers to operate at a higher point on their average cost curves.

Examples of this tendency to equate marginal cost and marginal revenue are common. For instance, if a farmer has a price expectation of $1.00 and his variable cost to harrow an acre are $0.60, he will not harrow unless he estimates that it will increase his yield 0.6 of a bushel. If his price expectation is $2.00 per bushel, he will harrow if he estimates that it will increase his yield only 0.3 of a bushel. Thus higher wheat prices have caused farmers to perform more farming operations and thereby have increased the total cost of production.

With a high fixed wheat price most small-grain farmers can make

profits by growing wheat and they may shift their resources into wheat
production. This desire to produce wheat coupled with the ability to
pay, since the wheat price increases farmers incomes, causes farmers to
bid up the price of land and other factors of production. When this
occurs the average cost curve shifts upward SAC_2 (Figure 1). Under pure
competition, a condition approached in wheat farming, the cost curve
shifts up until the lowest point on the curve is tangent to the price.
This upward shift of the cost curve is demonstrated by the high price of
wheat land.

High income and high income expectations may tend to make farmers
less conservative. They may over-invest in machinery and buy machinery
that increases the convenience of performing operations rather than re-
ducing costs.

The cost of seed makes up a sizable proportion of the total expense.
This expense is directly proportional to the price of wheat. The dollar
cost of share rent is also directly proportional to the price of wheat.
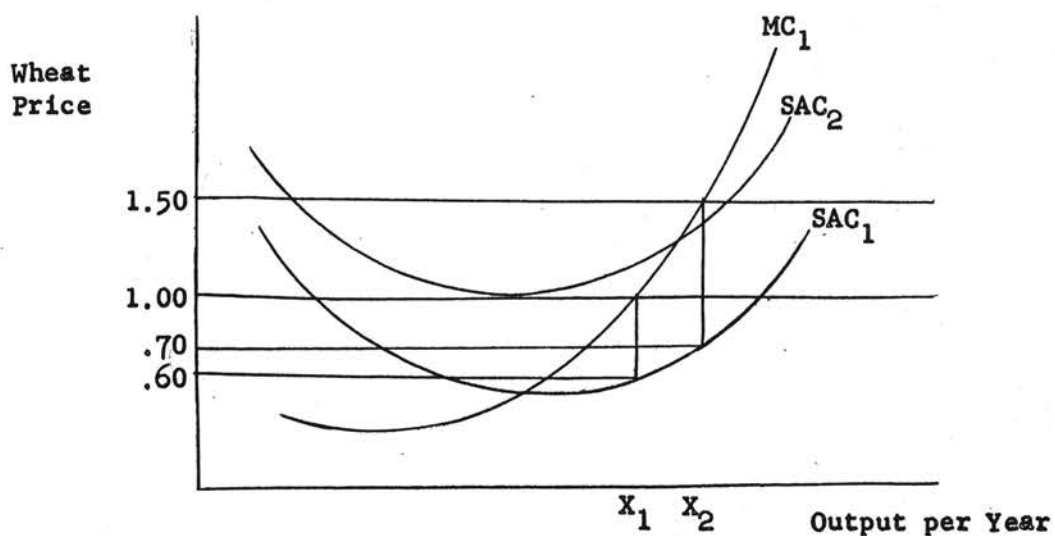
Figure 1 Farm Output at Different Prices

Comparing costs between periods introduces problems of comparing different points on the long-run average cost curve. The long-run average cost curve of individual farms is determined by the stage of technology and prices of the factors of production. Long-run average cost curves in different time periods might not be the same due to a difference in the stage of technology (Figure 2).

Comparing the average or typical cost in one period with the average or typical cost in another period might not show the full effect of technological change on reducing cost. In one period farm organization may be such that most farms are operating near the lowest point on the long-run average cost curve, SAC_1 (Figure 2). In another period the average farm may not be organized to take advantage of the existing technology and thus may be producing at costs that are higher than the lowest long-run average cost SAC_2 (Figure 2). If this were the case, a comparison of costs between these periods would be comparing a cost relatively low to the production techniques available in one period with a relatively high cost in another period.
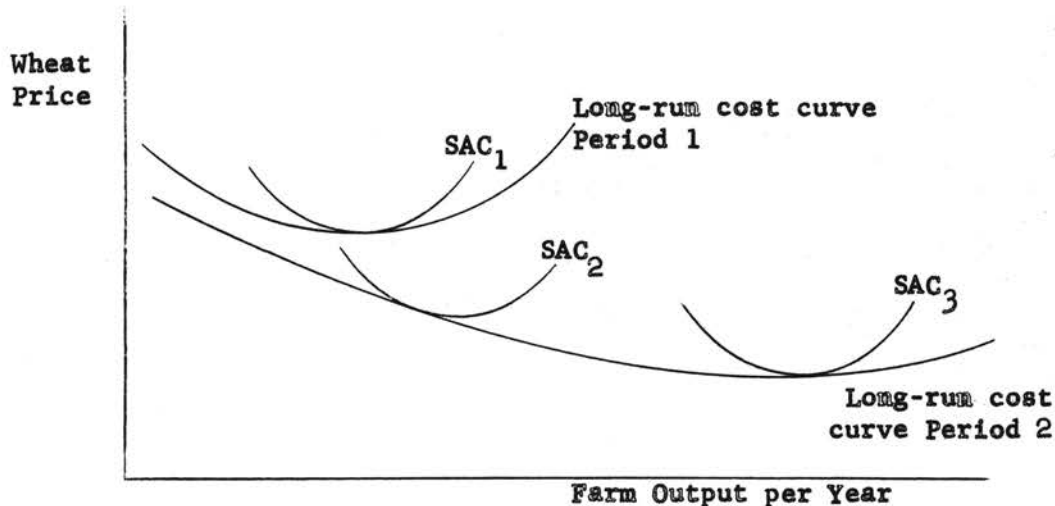
Figure 2. Long-run Cost Curves and Farm Organization in Different Periods

An average cost obtained by adding the individual cost of each farm and dividing by the number of farms would be smaller than an average cost obtained by adding the cost of producing each bushel and dividing by the total bushels. This would be the case if average farms had an organization SAC_2 (Figure 2). Farms with an organization SAC_2 would be producing a greater output per farm at a lower average cost. A simple average of individual farm costs does not take account of the greater production on large farms operating with lower unit costs.

In this thesis average costs are obtained for different years. The computed average costs in this study each represent only one point on the average cost curve. It should be kept in mind that this point on the curve may not be on the same part of the long-run curve in different periods and that the long-run curve is itself affected by the price of wheat as well as by technological changes.

Description of Area

Costs vary from area to area due to methods of cultivation and climatic conditions. For this reason it is necessary to define the area being described. In this thesis, Garfield County, Oklahoma is the principle area of study. This county was chosen for several reasons:

1. Garfield County is an important wheat producing county and is located in the center of the north central Oklahoma wheat producing area. Table I shows the national rank of several Oklahoma counties important in wheat production in the United States.

TABLE I

NATIONAL RANK OF OKLAHOMA COUNTIES IN WHEAT PRODUCTION

County	Acres		Bushels Harvested	
	1954	1949	1954	1949
Garfield	8	9	10	9
Texas	11	1	82	4
Grant	13	11	11	8
Beaver	23	10	*	12
Alfalfa	27	27	28	24
Kingfisher	34	25	24	23
Woods	45	58	92	43
Kay	47	55	13	38

*Not in first 100 counties

Source: United States Department of Commerce, Bureau of the Census, 1954 Census of Agriculture Ranking Agricultural Counties Volume III, Part 2, Washington 1956, p. 30

2. Cost of production studies were made in this area in 1920 and 1931, and the Department of Agricultural Economics at Oklahoma State University maintains farm account records of Garfield County farms. Therefore, more data is available for this county than for other counties.

3. Within the county the climate and methods of farming are generally homogeneous, hence it is not necessary to average widely different costs.

In order to compare the results of this study with the results of studies made of other wheat producing areas, it is necessary to know something of the climate, soil, location, and other conditions that affect crop production in Garfield County. The following description of the county is condensed from pages 1 through 13 of the soil survey map of

the county.

Garfield County is located in the north central part of Oklahoma. It is rectangular in shape, and it has an area of 1049 square miles or 671,360 acres. The elevation in the southwestern part of the county is approximately 1200 feet and in the southeastern part is about 1000 feet. At Enid, the county seat, the elevation is 1244 feet. The county is especially well supplied with railroads. Ten railroad lines radiate from Enid and no part of the county is more than 8 miles from a railroad.

The county includes two fairly smooth or gently undulating plains which slope to the east or southeast at the rate of about 6 feet to the mile. The uplands are well drained in most places. Less than 6 per cent of the land may be classed as strictly non-arable because of broken relief. Approximately 66 per cent of the land is comparatively highly productive, 4 per cent poor arable land, and 6 per cent non-arable. Most of the soils are comparatively fertile and well supplied with plant nutrients. Phosphatic fertilizer gives fair returns on some of the soils especially in the southwestern part of the county. The lighter soils in the southwest and northwest of Enid also respond to nitrogen. Nitrogenous fertilizer on the medium soils sometimes reduces yield by inducing rapid growth which exhausts the water supply. The surface soils are very fine sandy loams extending to a depth of 6 - 20 inches. A heavy claypan is present in the subsoil of some of the soils in the eastern part of the county.

The climate of the county is characterized by severe droughts. Summers are warm and temperatures of 105° F often occur. Hot southerly winds sometimes scorch vegetation. Winters are usually mild and open but characterized by short cold periods in which the temperature sometimes drops below zero. The average frost free season extends from March 30 to October 31, a period of 215 days. The average rainfall is about 30.66 inches.[1]

In general, the costs obtained for Garfield County apply to north

central Oklahoma and parts of south central Kansas. The farms in this

whole area are considerably smaller and more diversified than in the

more arid regions of the winter wheat belt. Also, yields are higher and

less variable, the soil is more intensively cultivated, the rate of seeding

is higher, and summer fallow is not practiced in this area.

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[1] E. G. Fitzpatrick, W. C. Boatright, and L. E. Rose, Soil Survey, Garfield County, Oklahoma United States Department of Agriculture Bureau of Chemistry of Soils Series 1935 Number 5 1939 pp. 1 - 13.

Production Methods and Farm Organization in Different Time Periods

The following brief description of the methods and organization common between 1910 and 1956 gives an idea of the changes that have occurred. Since the year to year changes are small, farm organization is described for only 5 different periods, 1910 - 1914, 1920, 1931, 1940, and 1956. These years were selected because they show the effects of changes in technology and of "boom" and depression.

The years 1910 - 1914 were chosen as the first period for two reasons:

1. The 1910 - 1914 period is frequently used as a base period. Most price indexes start with 1910 making it possible to estimate costs for intermediate years by the use of these indexes after 1910.

2. The practices used in this period were generally the same ones used when the area was first opened for settlement.

According to the census of agriculture, there were 3,291 farms in Garfield County in 1910. More than one-half of these farms were in the size group 100 - 174 acres. The 160 acre farm was the most common. Corn was planted on 153,546 acres and wheat on only 132,538 acres, thus wheat was not the most important crop in this period. Corn, wheat, oats, wild hay, alfalfa, and kaffir were the common crops in that order of importance.[2] Farming was highly diversified, in a survey of 35 farms only 9 had 3 crops or less and 6 farms had 6 or more.

The average farm had six horses for field operations and transportation. Wheat farming machinery usually included a gang plow, lister,

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[2]United States Bureau of the Census, Thirteenth Census of the United States, Volume VIII, Agriculture Washington 1913, p. 328

spike tooth harrow, grain drill, binder, and one or two wagons.

Several methods of wheat land preparation were in use but the most common was to moldboard plow after harvesting then to spike tooth harrow once or twice before drilling. Sometimes the land would be listed and worked down with a middle buster. If the land became too dry to plow with a moldboard it was sometimes worked with a disk plow.

Harvesting was usually done with a binder although headers were not uncommon. Most of the threshing was done from the shock in the field, however there was some stack threshing. The thresher usually threshed the shocked grain first and finished the season by threshing the stacked grain; thus the threshing season often lasted two months or more. Most farmers did not own their own threshing machines but depended on custom threshers. These custom threshers were usually local, operating within a 15 mile radius.

It was common practice to haul enough of the wheat to market at harvest time to pay the necessary bills. The balance of the wheat was stored on the farm to be hauled during the slack season.

By 1920 farm organization had changed considerably, and wheat had become the most important crop. Of 488,667 acres of cropland, 324,825 acres of wheat were harvested. Although the most common size of farm was still 160 acres, the trend was toward fewer and larger farms. The number of farms of 175 - 499 acres increased from 1,123 in 1910 to 1,223 in 1920. The number of farms of 500 - 1,000 acres increased from 36 to 45 and the number of farms over 1,000 acres increased from 0 to 3.[3]

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[3] United States Bureau of the Census, Fourteenth Census of the United States, 1920, Volume VI, Agriculture Washington 1922, p. 628

Gasoline tractors were beginning to replace horses and the steam engine. A few farmers used combines for harvesting, although the bind-shock-thresh method was still the most common.[4] Trucks were just beginning to be used for hauling wheat to market. Most of the wheat was still stored on the farm and transported during the slack period.

The 1930 census showed that wheat had become still more important; 16,977 more acres were harvested in 1930 than were harvested in 1920. The trend toward larger farms was indicated by the number of farms in the 500 to 1,000 acre size, increasing from 45 to 110 farms. The number of tractors in Garfield County was 1,462, almost one for every two farms. There were 687 trucks on farms.[5] The percentage of farms using combines to harvest their grain had increased to 37 per cent by 1930.[6]

Between 1930 and 1940, the total number of farms decreased from 3,478 to 2,900, indicating that the average size of farm was considerably larger. In this same period the number of tractors on Garfield County farms increased from 1,462 to 2,147.[7]

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[4] R. S. Washburn, Cost of Producing Winter Wheat in the Central Great Plains Region of the United States, United States Department of Agriculture Bulletin 1198, 1924, p. 34. Of the sampled farms 4 per cent used combines and 19 per cent used tractors for plowing.

[5] United States Bureau of the Census, Fifteenth Census of the United States, 1930, Volume II, Agriculture Washington, 1932, pp. 1,285, 1,354

[6] Robert B. Elwood and others, Changes in Technology and Labor Requirements in Crop Production Wheat and Oats, Works Progress Administration, National Research Project Report 10-A, 1939, p. 39.

[7] Bureau of the Census, United States Census of Agriculture, 1945, Volume I, Part 25, pp. 23, 38.

In 1940 practically all the wheat was planted and harvested with tractor powered equipment rather than horse drawn machinery. Common wheat equipment on Garfield County farms included a three plow tractor, a 3 bottom plow, a 12 foot spring tooth harrow, a 16 foot drill and a 12 foot pull-type combine.

In 1954 there were 659 fewer farms than there were in 1940. The number of farms above 1,000 acres increased from 13 to 37 between 1940 and 1954. There were 2,910 tractors, 2,370 trucks, and 1,374 combines on farms in the county in 1954.[8] This large amount of equipment shows how completely farming had become mechanized. The main changes in wheat farming methods that occurred between 1940 and 1956 were the use of larger tractors, larger plows and harrows, and the use of self-propelled combines instead of pull-type combines. Field cultivators were often used in place of springtooth harrows. Custom combining was a common method of harvesting wheat.

A survey made in the area in 1956 describes the typical farm as having 480 acres with 360 acres in cultivation, 104 acres of native pasture, and 16 acres of farmstead and roads. Of the cultivated land 216 acres were in wheat.[9]

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[8]United States Bureau of the Census, 1954 Census of Agriculture, Volume I, Counties and State Economic Areas, Part 25, Washington 1956, pp. 85, 95.

[9]Odell L. Walker, Adjustment Alternatives for North Central Oklahoma Wheat Farmers, Master Thesis, Oklahoma State University, 1957, p. 11.

CHAPTER II

COSTS BY THE CONVENTIONAL METHOD

The 1910 - 1914 cost was computed using the same per acre estimates
for horse operations that were used in computing the costs in 1920 (Table
II). The hourly charge for horse labor was computed by dividing the esti-
mated annual cost per work horse of $81.98 by 740 hours of use per year.
The machinery expense was estimated as 15 per cent of the average invest-
ment in machinery of $3.00 per crop acre.[1] The miscellaneous expense has
been estimated as 15 per cent of the cost of labor, power, and materials
since this same method was used in the 1920 study. The $0.12 per bushel
threshing charge was an estimate made after interviewing several older
Garfield County farmers who gave $0.10 to $0.12 as the custom cost in
this period. The higher figure was used because the farmer often sup-
plied horse feed and hauled coal for the steam engine.

No cost of production studies were found for Oklahoma as far back
as 1910, however several studies were made in other states. The per acre
cost of producing wheat in Minnesota during the period 1908 - 1916 was
$10.32, $12.60, and $13.04 in three counties. The cost of producing an

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[1]
    Data for estimating the annual expenses of workhorses and the
machinery investment came from an unpublished study made in Kay County
in 1914.

acre of wheat in Missouri was $12.30 and in Nebraska $12.18.[2] The total costs and individual expense items in these studies are about the same as the 1910 – 1914 Oklahoma cost.

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[2] F. W. Peck, Cost of Producing Minnesota Farm Products – 1908 – 1912, University of Minnesota Agricultural Experiment Station Bulletin 145, 1914, p. 29.

O. R. Johnson and W. E. Foard, Cost of Production on Missouri Farms, Missouri Agricultural Experiment Station Bulletin 125, 1915, p. 306.

C. W. Pugsley, Cost of Growing Crops in Nebraska, Nebraska Experiment Station Bulletin 122, 1911, p. 9.

TABLE II

WHEAT PRODUCTION COSTS GARFIELD COUNTY, OKLAHOMA 1910 - 1914

Operation	Times over[a] or % of acreage covered	Hours per acre[b] once over		Total man hours	Cost of man[c] labor at $.15 an hour pre-harvest $.20 harvest	Cost of horse labor at $.11 an hour	Total cost
		Man	Horse				
Plow	.8	2.5	10.6	2.0	.30	.93	$1.23
Disk	.4	1.1	4.7	.4	.07	.21	.28
Harrow	1.4	.6	2.8	.8	.12	.43	.55
Drill	1.0	.7	2.8	.7	.10	.31	.41
Cut	1.0	.7	3.1	.7	.10	.34	.44
Shock	1.0	1.3		1.3	.26		.26
Shock thresh		3.1	3.5	3.1	.62	.38	
Shock thresh contract	1.0 (13 bu.) .12¢ bu.						1.56
Haul to bin and market	1.0	1.6	3.0	1.6	.24	.33	.57
Total man hours and cost of man and horse labor				10.6	1.71	2.33	

	Amount per acre	Price		
Seed & treatment	1 bu.	.92		.92
Twine	2 lb.	.12		.24
Machinery expense				.45
Miscellaneous 15% of labor and materials				1.04
Land use 1/3 of 132 bu. at .84				3.70
TOTAL				11.65

[a] Robert B. Elwood and others, Changes in Technology and Labor Requirements in Crop Production Wheat and Oats, Works Progress Administration, National Research Project Report 10-A, 1939, p. 39.

[b] R. S. Washburn, Cost of Producing Winter Wheat in Central Great Plains Region of the United States, United States Department of Agriculture Bulletin 1198, 1924, p. 34.

[c] United States Department of Agriculture Yearbook 1921, Washington, 1922, p. 784.

Costs in 1920 and 1931

Studies made in Garfield County in 1920 and 1931 provide cost esti-
mates for those years. The 1920 study provided cost information for
owner and tenant farmers in Garfield County and the southern plains
(Table III).

The average costs of producing an acre of wheat on 32 Garfield
County farms in 1931 was $10.14 (Table IV). The total costs for each
item of expense on the 32 farms were divided by the total acres of wheat
on all farms. This had the effect of making certain expense items, such
as twine which is not used on all farms, abnormally small. This method
has an advantage in a transition period such as 1931 of showing the
average percentage of total cost made up by each expense item and gives
some idea of the state of technology.

Costs in 1940

The 1940 cost of producing wheat is shown in Table V. The invest-
ment in machinery of $9.32 per crop acre was the average investment on
47 farms whose owners kept farm account records with Oklahoma State Uni-
versity. The per acre investment was obtained by dividing the average
farm machinery investment $2,653 by the average acres of cropland, 284.5.
Miscellaneous expense includes the depreciation and repair expense on
farm improvements of $132, and the taxes on improvements, $13.00. This
expense was allocated to the wheat enterprise on the basis of the per-
centage of total income from wheat, 49.2 per cent, divided by the acres
of wheat 178.6. This gave a charge of $.40 per acre. In addition, the
farm share of auto expense estimated from farm records as $200 allocated
to the wheat enterprise gave a cost of $.55 per acre. Fifteen days of

operator management at $2.15 per day gave a cost of $.18 per acre. The sum of these costs gave a total miscellaneous cost of $1.13 per acre.

Twenty per cent of the average per acre machinery investment is allowed as fixed machinery expense. This would be about 13 per cent for depreciation, two per cent for taxes, and five per cent for interest. The 1940 equipment depreciation expense taken from 47 farm records was $2.48 per crop acre. The machinery expense by the above method is $.56 per acre less but part of this difference is included under the auto expense in overhead and part of the $2.49 depreciation expense should be charged to the livestock enterprise.

Costs in 1956

The 1956 costs of production are presented in Table VI. The charge for rent was estimated as 1/3 of the average planted yield, in 1956 this was 17.8 bushels per acre times the Oklahoma seasonal average price of $2.00. Labor requirements are for 1950, but it was felt that labor requirements had not changed appreciably between 1950 and 1956.

The farm machinery investment of $28.65 per acre was the average investment on the farms whose owners kept records with Oklahoma State University. The expenses were averaged over three years, 1953, 1954, and 1955 because of the small number of record keepers. Twenty per cent of the average per acre investment in machinery was used as the fixed cost.

The miscellaneous expense is estimated from expense items in the 1955 Garfield farm account records. Miscellaneous expense per farm includes $337 auto expense, $321 repairs and depreciation on buildings, and $20 taxes on improvements. These expenses, allocated to the wheat enterprise by the percentage of total income from wheat and divided by

wheat acres, gave a cost of $1.21 per acre. In addition operator time used in buying seed and machinery, arranging for custom work and hired labor, and keeping farm records was estimated at $1.00 per acre.

TABLE III

WHEAT PRODUCTION COSTS IN 1920

Items	Garfield County		Missouri, Nebraska, Kansas & Oklahoma			
	Owner	Tenant	Owner	% of Total	Tenant	& of Total
Average yield per acre (bu.)	18.4	17.8	14.9		14.3	
Tenant share of yield (bu.)		11.5			9.2	
Operating expense per acre:						
Labor and power						
Prepare land and seed	.....	.....	.....	17.9	.....	12.0
Man labor	1.53	1.50	1.24		1.09	
Horse power	2.60	2.32	2.01		1.59	
Contract labor	.06	.07	.17		.15	
Harvest and market	.....	.....	.....	24.1	.....	26.8
Man labor	2.68	2.54	3.01		3.11	
Horse power	1.09	1.00	1.23		1.05	
Contract labor	.11	.16	.35		.30	
Material costs	.....	.....	.....	13.7	.....	12.6
Seed	2.34	2.11	2.10		1.78	
Binder twine	.35	.39	.18		.23	
Manure and straw	.08	.08	.16		.06	
Fertilizer	.....	.....	.18		.02	
Threshing	4.33	4.50	2.50	13.1	2.30	13.9
Other costs	.....	.....	.....	31.2	.....	29.7
Taxes and insurance	.82	.....	.55		.....	
Special crop insurance	.09	.15	.38		.56	
General farm machinery	2.28	1.67	1.62		1.25	
Tractor and combine	.72	.86	.60		1.01	
Loss abandoned acreage	.02	.....	.94		.48	
Overhead	2.28	2.20	1.86		1.64	
Total	21.38	19.55	19.08	100.0	16.62	100.0
Credits	.26	.27	.43		.47	
Net operating expense:						
Per acre	21.12	19.28	18.65		16.15	
Per bushel	1.15	1.68	1.25		1.77	
Interest on investment:						
Land	9.43		7.65			
Machinery		.75			.56	
Net cost, including interest:						
Per acre	30.55	20.03	26.30		16.71	
Per bushel	1.66	1.75	1.80		1.83	

R. S. Washburn - Cost of Producing Winter Wheat in Central Great Plains Region of United States, United States Department of Agriculture Bulletin 1198, April, 1924, pp. 19, 21.

TABLE **IV**

ITEMS OF EXPENSE AND AVERAGE COSTS PER ACRE AND PER BUSHEL OF
WHEAT ON 32 GARFIELD COUNTY FARMS IN 1931

Item of expense	Expense per acre	Expense per bushel	Per cent of total expense
Tractor cost, 1.4 hrs.	$ 1.10	$ 0.054	10.0
Combine cost (owned)	.47	.023	4.3
Combine cost (hired)	.17	.008	1.5
Miscellaneous Machinery	.56	.028	5.1
Operator's labor, 4.25 hrs.	.68	.034	6.2
Hired labor, 1 hr.	.15	.007	1.4
Horse labor, 6.5 hrs.	1.07	.053	9.7
Seed cost, 1 bu.	.61	.030	5.5
Twine cost, 1 lb.	.10	.005	.9
Threshing cost	.42	.021	3.8
Taxes on wheat land	.84	.041	7.6
Land charge (5% int.)	2.73	.135	24.8
General farm expense	2.11	.104	19.2
Gross expense	11.01	.543	100.0
Pasture credit	.87	.043	7.9
Net expense	10.14	.500	92.1
Value of wheat	7.10	.350	64.5
Net loss	3.04	.150	27.6

Acres of wheat per farm..........157
Yield per acre................... 20.3 bu.

Source: A. Leonard, The Cost of Producing Wheat in Garfield County
in 1931, Masters Thesis Oklahoma State University, 1933, p. 30.

TABLE V

WHEAT PRODUCTION COSTS IN 1940, GARFIELD COUNTY, OKLAHOMA

Preharvest
    Man labor,[1] 1.7 hrs. @ $.22[2]   .37
    Tractor and equipment operating expense, 1.6 hr.
      @ $.53[3]   .85
    Seed .65 bu. plus 10% cleaning   .71
                                      $1.93

Harvest
    Man labor, 1.1 hr. @ .22   .24
    Tractor, .3 hr. @ .51   .15
    Combine, .3 hr. @ .29   .09
    Truck, .4 @ .51   .20
                                        .68

Fixed
    Machinery fixed expense per crop acre,
      20% x $9.60[4]   1.92
    Rent, 1/3 of $.62 x 11.7 bu.   2.42
      (average yearly price plus yield)
    Miscellaneous   1.13

        Total fixed   5.47

                TOTAL $8.08

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[1]
Labor and equipment requirements from an unpublished study on file in Department of Agricultural Economics, Oklahoma State University.

[2]
United States Department of Agriculture, Crops and Markets, July, 1940, Volume 17, Number 7, p. 114, The Average Wage Rate Per Day Without Board, July 1, 1940 in Oklahoma was $1.50 in Kansas it was $2.15. Kansas rates were used as they are probably more typical of this area than Oklahoma rates.

[3]
Tractor operating expense taken from O. J. Scoville, Practices and Costs on Wheat Farms in Western Kansas, 1947, Kansas State College Agriculture Experiment Station Circular 268, 1950, pp. 18 - 19.

[4]
Average per crop acre machinery investment from Garfield farm account records kept by Department of Agricultural Economics, Oklahoma State University.

TABLE VI

WHEAT PRODUCTION COSTS IN 1956 GARFIELD COUNTY, OKLAHOMA

Variable costs to prepare and plant[1]

Labor 2 hours[2] @ $1.00[3]	$ 2.00	
Variable machine expense plow @ $.67	.67	
Harrow 3 times @ .23	.69	
Drill @ .24	.24	
Seed & treatment	2.25	
Total variable pre-harvest		$ 5.85

Variable costs to harvest

Labor .7 hrs. @ $1.00	.70	
Combine	.48	
Haul	.21	
Total variable harvest		$ 1.39

Fixed cost

Land charge 1/3 of 17.8 bu. @ $2.00	11.86	
Fixed machinery expense 20% of $28.65 per acre	5.73	
Miscellaneous	2.21	
Total fixed		$19.80

TOTAL COST	$27.04

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[1] Variable costs except labor and hauling obtained from: Odell L. Walker, Masters Thesis, Adjustment Alternatives for North Central Oklahoma Wheat Farmers, Oklahoma State University, 1957, p. 19.

[2] Labor requirements from, United States Department of Agriculture Bureau of Agricultural Economics, Crop Production Practices, FM 92, Section 4, Washington, 1953, p. 191.

[3] United States Department of Agriculture Agricultural Marketing Service, Farm Labor, Washington, July 10, 1956, p. 9, Oklahoma hourly farm labor rate on July 1, 1956 was $.87. The Kansas rate was $1.05. The Garfield County rate was estimated to be $1.00.

Summary of Costs by the Conventional Method

The costs obtained by the conventional method are summarized on Table VII. In order to be able to make comparisons between years the horse labor and machinery costs were grouped under the heading power and equipment.

One-third share rent was used to obtain a charge for land use rather than charging a percentage of the land value for several reasons. First, the land value is influenced by factors other than its ability to produce wheat, such as the value of mineral rights, location, improvements, and the amount of money people have to invest. Second, the average price of wheat land is difficult to determine accurately. Third, land values are slow to adjust to changes in the general price level, thus land charges computed from land values might not be representative of the year in question. Fourth, the one-third share rent system is easy to compare between periods and represents the actual cost to many farmers who are renting.

In 1920 and 1931, when part of the labor cost was included under threshing, an estimate of the cost of labor in the threshing bill was included under harvest labor; the remainder of the threshing expense was included under power and equipment. The 1920 costs of owners and renters were averaged to determine the cost in Table VII. Credit for wheat pasture in 1920 and 1931 was omitted since wheat pasture was not available in many years. Even when it was available some farmers did not use it because of the expense of fencing and buying livestock.

TABLE VII

WHEAT PRODUCTION COSTS 1910 - 1956
GARFIELD COUNTY, OKLAHOMA

		1910-14	1920	1931	1940	1956
Pre-harvest	Labor	.59	1.58	.50	.37	2.00
Harvest	"	1.22	4.20	.33	.24	.70
Power & equipment		3.94	9.10	3.79	3.21	8.02
Seed		.92	2.22	.61	.71	2.25
Twine & fertilizer		.24	.45	.10		
Land use charge		3.70	9.33	1.75	2.42	11.86
Miscellaneous		1.04	2.36	2.11	1.13	2.21
TOTAL		11.65	29.24	9.19	8.08	27.04

Costs in Other Areas

Wheat production costs for the Southern Plains and the United States are given in Table VIII.[3] The Southern Plains area did not always include the same states. The states to which the cost data apply are shown; their identity should be kept in mind when making comparisons between years.

It is difficult to compare the costs in Table VIII with the Garfield County costs because computing methods were different.

These costs are given to show another method of computation, and to compare the Southern Plains with the United States. The Southern Plains cost was considerably lower than the cost in the United States in both 1931 and 1940. In both of those years, however, the Southern Plains costs were considerably higher than the Garfield County costs.

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[3] This cost of production series is given for the years 1922 - 1946 in the Yearbook of Agriculture, and in Agricultural Statistics.

TABLE VIII

COST OF PRODUCING WHEAT IN THE SOUTHERN PLAINS AND THE UNITED STATES 1930 to 1941

Area and year	Yield	Prepare & plant	Harvest	Haul to market	Fertilizer & manure	Seed	Misc.	Land rent	Credit for by product	Total
United States										
1941	16.9	2.65	2.96	.84	.68	1.06	2.60	3.08	.46	13.41
1940	15.3	2.58	2.79	.71	.68	1.14	2.58	3.12	.48	13.12
1939	14.1	2.58	2.66	.63	.67	.85	2.52	3.12	.50	12.53
1932	13.0	2.10	1.93	.46	.60	.61	1.89	2.67	.33	9.93
1931	16.2	2.57	2.61	.68	.78	.86	2.09	3.46	.54	12.51
1930	18.0	3.75	3.82	1.00	2.27	1.59	2.56	6.14	1.48	19.65
Nebraska, Kansas, Colorado, Texas, and Oklahoma										
1941	13.7	2.18	2.37	.59	.13	.83	2.42	2.81	.26	11.07
1940	13.3	2.09	2.27	.53	.11	.87	2.85	2.98	.27	11.43
1939	11.8	2.08	2.20	.45	.11	.67	2.64	2.94	.25	10.84
Texas, Oklahoma, Kansas, and Nebraska										
1932	12.7	1.72	1.70	.33	.18	.43	1.65	2.52	.09	8.44
1931	19.1	2.23	2.57	.68	.40	.67	1.74	3.12	.20	11.21
Oklahoma										
1932	11.0	1.67	1.64	.37	.10	.36	1.42	1.87	.11	7.32
1931	17.0	1.83	2.49	.67	.09	.63	1.43	2.44	.18	9.40

Source: United States Department of Agriculture Agricultural Statistics years 1943, 1942, 1941, pp. 414, 672, 576.

United States Department of Agriculture Yearbook of Agriculture years 1934, 1933, 1932, pp. 702, 706, 896.

CHAPTER III

FARM ACCOUNT METHODS OF OBTAINING WHEAT PRODUCTION COSTS

Farm accounts record all the expenses that farmers incur in producing their crops. These records give total costs but are often not kept in sufficient detail to obtain costs of each enterprise. In order to estimate the cost of producing wheat from total farm income and expense information, two procedures were used. One of these procedures was to allocate total costs to the wheat enterprise on the basis of the percentage of total income from wheat. The other procedure was to assume that the costs of enterprises other than wheat were equal to the receipts in these enterprises, and the balance of expenses was the cost of producing wheat.

The assumptions that costs are proportional to receipts and that costs in other enterprises equal receipts in these enterprises are probably not true. However, using these methods provides some additional information. First, the cost is computed taking account of total expenses. Some of these expenses may be overlooked in the conventional approach. Second, allocating the total farm expenses to the wheat enterprise by the above procedures indicates how effective other enterprises were in reducing the cost of wheat production. Third, this method indicates actual changes in farm expenses between periods.

Costs on Garfield County Farms

The agricultural Economics Department at Oklahoma State University

has kept farm account records of Garfield County farms since 1929.
These records provided the 1930 - 1955 data in Table IX. A survey made
in Kay County, adjacent to Garfield County to the northeast, provided
information for the 1914 period.

Allocation of costs derived by the method that costs are propor-
tional to receipts resulted in a higher cost of production in the 1939
- 1941 period than was obtained by the other accounting method. This
indicates that other enterprises might have had some effect in reducing
costs in this period. The labor expense by the method that costs in
other enterprises equal receipts in these enterprises was considerably
higher than the labor cost obtained by the conventional method.

Costs in Southern Plains

The Southern Plains area described in this study includes part of
the panhandles of Texas and Oklahoma, western Kansas, southwest Nebraska,
northeast Colorado, and southeast Wyoming.[1]

A brief description of the methods used in handling the data for
this section is in order. The percentage of receipts from wheat is the
cash receipts divided by total receipts. It was not possible to adjust
these receipts by inventory changes since the wheat inventories were un-
available. Total farm expenses were adjusted by inventory changes and
these adjusted expenses used in computing costs. Three year periods were
averaged to reduce the effect of inventory changes.

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[1] W. D. Goodsell and others, Costs and Returns, Commercial Family -
Operated Farms by Type and Size 1930 - 1951.

United States Department of Agriculture Statistical Bulletin 197,
1956, A map of the area is found on page 11.

TABLE IX

COST OF PRODUCING WHEAT IN GARFIELD COUNTY 1914 - 1955

Year	Unit	1914	1930-32	1939-41	1953-55
Records average	No.	23	43	48	14
Size of farm	Acre	210	332	360	392
Planted wheat	Acre	42.7	170	187	206
Yield per acre	Bu.	a	19.1	17.2	13
Total income	$	1618	2842	4944	11218
Wheat income	$	828	1284	2110	6284
Total expenses	$	620	2329	2425	8910
Unpaid labor	$	471	637	720	1600
Total expenses & labor	$	1091	2966	3145	10510
Interest on invest- ment, 5 per cent	$		1397	1236	2858
Expenses, labor & interest	$		4363	4381	13368
Per cent of income from wheat	%	49.3	45.2	42.7	55.6
Cost per acre proportional method					
Cost less labor	$	7.16[b]	6.19	5.54	24.5
Cost plus labor	$	12.60	7.89	7.18	28.37
Cost, labor, & interest	$	a	11.60	10.00	36.08
Cost per acre expenses equal receipts method					
Cost less labor	$	- 5.45	4.54	- 2.19	19.13
Cost plus labor	$	5.57	8.28	1.66	26.89
Cost plus labor & interest	$	a	16.50	8.27	40.77
Labor cost Expenses equal receipts method	$	11.02	3.74	3.85	7.76
Proportional method	$	5.44	1.70	1.64	4.32
Interest cost Expenses equal receipts method	$	a	3.71	2.82	7.71

[a]Not available.

[b]Method of computing, (wheat receipts 828 / total receipts 1681) ·
(expenses 620 / wheat acres 42.7).

[c]Method of computing, cash expenses, 620 - (total receipts, 1681 -
wheat receipts 828) / wheat acres 42.7.

The charge for family labor was obtained by dividing the total expenses for hired labor by the hours worked annually to derive a wage rate. This wage rate times the hours worked was used as the charge for operator and family labor. The charge for capital, given in the reference cited, varied from year to year. In the 1930 - 1932 period it was 6.17 per cent, in the 1939 - 1941 period 4.62 per cent, and in the 1953 - 1955 period 4.73 per cent.[2]

In all periods except 1953 - 1955, the cost by the method that costs in other enterprises equal receipts in these enterprises was higher than the cost by other methods. This indicates that in 1953 - 1955 other crops reduced costs. Limitations on wheat acreages might be one reason other enterprises lowered costs.

Under the assumption that costs in other enterprises equal returns in these enterprises, the cost was lower in all cases in the Southern Plains than it was in Garfield County except for the years 1939 - 1941. This indicates that other enterprises lowered the cost in Garfield County in that period.

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[2] For a detailed description of the data and methodology see W. D. Goodsell, Farm Costs 1930 - 1951, pp. 1-13, 54.

W. D. Goodsell and others, Farm Costs and Returns 1955 (with comparisons) Commercial Family Operated Farms by Type and Location, United States Department of Agriculture Agriculture Information Bulletin 158, p. 56.

TABLE X

COST OF PRODUCING WHEAT, SOUTHERN PLAINS 1930-55

	Unit	1930-32	1939-41	1953-55
Land in farm	Acre	560	593	696
Cropland harvested	"	378	228	356
Wheat harvested	"	293.9	173	234
Harvested yield	Bu.	14.5	11.7	13.9
Operator labor	Hrs.	2210	1920	2187
Hired labor	"	1463	800	363
Total capital	$	25538	19234	74470
Total cash receipts	"	2705	2220	11019
Wheat receipts	"	1698	1053	7221
Hired labor expenses	"	281	177	333
Expenses and decreases	"	1984	1705	4922
Labor at hired rates	"	424	425	2008
Expenses and labor	"	2408	2130	6930
Charge for capital	"	1573	890	3596
Expenses labor and interest	"	3981	3020	10526
Percent of cash receipts from wheat	Percent	62.8	47.4	65.4
Cost per acre proportional method				
Cost less labor	$	4.24	4.67	13.76
Cost plus labor	"	5.15	5.84	19.37
Labor cost	"	.91	1.17	5.61
Cost plus labor and interest	"	8.51	8.27	29.42
Capital cost	"	3.36	2.44	10.05
Cost per acre expenses = receipts method				
Cost less labor	"	3.32	3.11	4.80
Cost plus labor	"	4.77	5.57	13.38
Labor cost	"	1.45	2.46	8.58
Cost plus labor and interest	"	10.12	10.71	28.75
Capital cost	"	5.35	5.14	15.37

Source of primary data:

W. D. Goodsell, p. 54
W. D. Goodsell and others, p. 56

CHAPTER IV

CHANGES IN LABOR REQUIREMENTS OF PRODUCING WHEAT

Probably the greatest change in wheat producing methods is the use
of less human labor. In the 46 year period from 1910 - 1956 the labor
requirements for producing an acre of wheat in Garfield County de-
creased from 10.6 to 2.7 hours. This is a decrease of 7.9 hours or
74.5 per cent.

Table XI shows the labor requirements for producing wheat from 1910
to 1953 in the United States. Evidently the labor requirements in the
United States have been higher than in Garfield County throughout the
period. In this period labor requirements in the United States de-
creased 10.8 hours or 71 per cent. Although labor requirements de-
creased by more actual hours in the United States than in Garfield
County, they decreased less percentagewise.

TABLE XI

MAN HOURS AND YIELD PER ACRE HARVESTED AND MAN HOURS PER 100 BUSHELS
OF WHEAT, UNITED STATES[1]

	1910-14	15-19	20-24	25-20	30-34	35-39	40-44	45-49	50-53
Man hours Per acre	15.2	13.6	12.4	10.5	9.4	8.9	7.4	5.6	4.4
Yield	14.4	13.9	13.8	14.1	13.5	13.2	17.1	16.9	17.1
Man hours per 100 bu.	106	98	90	74	70	67	43	33	26

[1]Ruben W. Heckt and Keith R. Vice, Labor Used for Field Crops,
United States Statistical Bulletin 144, June, 1954, p. 4.

Although more tillage operations are now performed than in the 1910 period, less hours of labor are required. If the same pre-harvest operations were performed in 1956 as in 1910, that is, plowing 80 per cent of the land, disking 40 per cent and harrowing 1,4 times, which took 3.9 hours in 1910, it would require only 1.13 hours of labor in 1956 instead of 2 hours as shown in the 1956 cost estimate. Putting it another way, to plow 40 acres in 1910 took about ten, 10 hour days. In 1956 it took 20 hours which could be done in a single day.

Even greater reductions in labor requirements have occurred in the harvesting operation. In 1910 harvesting with the bind-shock-thresh method required 5.1 hours per acre. In 1956 combine harvesting required only .4 hours, a saving of 4.7 hours. Hauling the grain to market with a team took about 1.6 hours per acre in 1910. Truck hauling in 1956 took only .32 hours.

The total labor requirement for producing 40 acres of wheat in 1910 was about 424 hours. In 1956 the labor requirement to produce 40 acres of wheat was 108 hours. If a farmer were to work the same number of hours in 1956 as he did in 1910, he would be able to farm about four times the acreage.

Wage Rates

The wage rates used in the different years in this study were: $0.15 per hour in 1910 - 1914, $0.15 per hour for pre-harvest labor and $0.58 per hour for harvest labor in 1920, $0.16 per hour in 1931, $0.22 per hour in 1940 and $1.00 per hour in 1956. Thus the wage rate in 1956 was considerably higher than in any of the years studied. The 1956 rate was almost seven times the 1910 - 1914 rate. Labor made up

15.6 per cent of the cost in 1910 - 1914 and 9.9 per cent of the cost in 1956. In the intermediate years labor was a smaller percentage of the total cost mostly because of the low wage rates.

It is interesting that the wage rate in the Southern Plains in 1930 - 1932 was $0.19 per hour and in 1939 - 1941 the rate was $0.22 per hour. These rates are very close to the wage rates used in the conventional method.

CHAPTER V

YIELD AND PRICE CHANGES

The Garfield County yields vary a great deal from year to year, (Figure 3). This presents a problem of learning if there is a trend toward higher yields. A regression analysis using the planted yield as the dependent variable and time as the independent variable indicated a yearly increase of 0.09 bushels per acre. A statistical "t" test of this increase indicated that it was not significantly different from zero. Therefore, it is not correct to assume that there has been a trend toward higher yields on the basis of this information. The yield data for Garfield County were only available for the years 1919 - 1956 inclusive. In this period the average planted yield was 13.2 bushels per acre.

It seems that the average yield should have increased during the years studied because of more timely and thorough soil preparation, the use of fertilizer, insecticides and better varieties. One reason for the yields remaining constant, even with better farming methods, is that cropping has removed many of the plant nutrients and organic matter. The following quote taken from the county soil survey indicates how much cropping has depleted the soil.

The loss of total organic matter on cultivated soils was 40 per cent of the organic matter on uncultivated soils. The loss of total nitrogen on cultivated soils was 30 per cent of the nitrogen on uncultivated soils. The first important limiting factor in plant development on the average soils in this county is the supply of available nitrogen.[1]

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[1] E. G. Fitzpatrick, W. C. Boatwright and L. E. Rose, Soil Survey Garfield County, Oklahoma, United States Department of Agriculture Bureau of Chemistry of Soils, Series, 1935, No. 5, March 1939, p. 33.
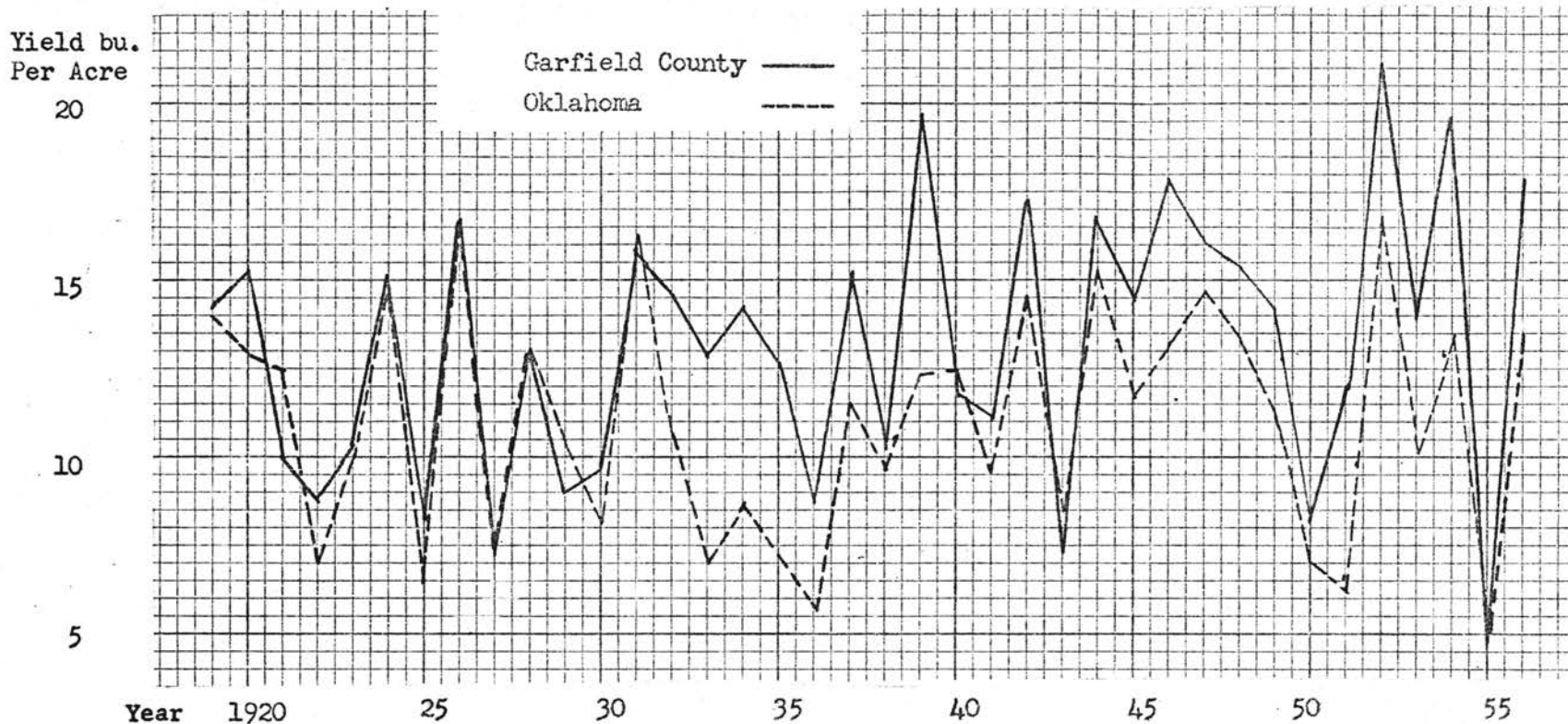
Figure 3. Average Planted Wheat Yield Garfield County and Oklahoma

Source: 1919 - 1934 data from, K. D. Blood and Majorie L. Hill, Wheat Production in Oklahoma 1894 - 1938, Oklahoma Agricultural Experiment Station, Circular 92, 1941, pp. 9 - 48.

1935 - 1947 data from, A Statistical Handbook of Oklahoma Agriculture, Experiment Station Miscellaneous Publication 14, 1949, pp. 15, 68 - 82.

1948 - 1956 data from, Oklahoma Wheat: Acreage Yield and Production, Oklahoma Crop and Livestock Reporting Service, Oklahoma City (annual mimeographed reports).

Effect of Yield and Wheat Price on Cost

One-third land rent is computed in different ways in Table XII to show the effect of yield and price changes on the charge for land rent. In order to compare one-third rent with a land charge using land values, 7 per cent of the value of land and buildings, values taken from the Census of Agriculture, is also shown. The effect of average yields instead of prevailing yields on harvesting costs is also shown. The cost of producing wheat in each year adjusted for yield changes is shown on the last line of the table. There does not appear to be any trend in yields so it is more meaningful to compare costs without the effect of yield when trying to determine trends in the cost of production over a period of time. If it was desired to know the actual differences in total cost between two years then it would be necessary to compare the costs using prevailing yields.

TABLE XII

EFFECT OF WHEAT PRICE AND YIELD ON COST

Method of charging for land use	Year				
	1910-14	1920	1931	1940	1956
7 per cent of census value of land and buildings	$ 3.33	$ 5.28	$ 4.51	$ 3.84	$ 9.94
1/3 rent, prevailing yield and price	3.70	9.33	1.75	2.42	11.86
1/3 rent, prevailing yield and average price	5.59	6.54	6.84	5.03	7.65
1/3 rent, average yield and average price	5.68	5.68	5.68	5.68	5.68
1/3 rent, average yield and prevailing price	3.70	8.10	1.45	2.73	8.80
Difference between average yield and prevailing yield	0	-1.23	- .30	+ .31	-3.06
Effect of average yield on harvesting cost	0	-1.22	- .35	+ .10	- .35
Cost from Table VII	11.65	29.24	9.19	8.08	27.04
Cost of producing wheat charging 1/3 share rent at average yield and prevailing price	$11.65	$26.79	$8.54	$8.49	$23.63

Effect of Changes in the General Price Level on Cost

Table XIII shows the effect of changes in the general price level on costs. The computed costs using average yields have been adjusted by the United States index of wholesale prices, all commodities, and the United States index of prices farmers pay for production items. The index of wholesale prices is the best indicator of changes in purchasing power, but adjusting by the index of prices paid for production shows how much production items have increased in cost. The costs adjusted by the production index are more appropriate for this problem. It is interesting that the price of production items has increased more than the general price level. Adjusting by the production index increased the cost more in 1910 - 1914, 1920 and 1940 and less in 1931 than adjusting by the wholesale prices index. The real cost of producing wheat, in 1956 dollars, was less than in 1910 - 1914 or 1920, and it was only 121 per cent of the 1940 cost and 128 per cent of the 1931 cost.

TABLE XIII

EFFECT OF CHANGES IN THE GENERAL PRICE LEVEL ON COST
OF WHEAT PRODUCTION

	1910-14	1920	1931	1940	1956
Cost using average yields	11.65	26.79	8.54	8.49	23.63
Cost in 1956 dollars adjusted by index of wholesale prices	29.94	30.59	20.41	18.97	23.63
Cost in 1956 dollars adjusted by production index	33.78	38.01	18.48	19.54	23.63

The transitional parity price, in effect in 1956, was 95 per cent of the parity price computed by the method of taking the 1910 - 1914

base price times the old parity index. The justification for using
this method of obtaining a price would be that costs have increased as
much as the parity index. The computed costs for each of the years
studied and the 1910 - 1914 cost adjusted by the parity index are shown
in Table XIV.

TABLE XIV

COMPARISON OF COMPUTED COST OF WHEAT PRODUCTION
AND 1910 - 1914 COST ADJUSTED BY PARITY INDEX

Year	1910-14	1920	1931	1940	1956
Computed cost	11.65	27.29	8.54	8.49	23.63
1910 - 1914 cost adjusted by parity index	11.65	24.93	15.14	14.45	33.20

This shows that costs in 1931, 1940 and 1956 have not risen as
much as the 1910 - 1914 cost adjusted by the parity index. Advances
in wheat production technology have reduced the cost more than price
increases have increased it.

The cost of producing wheat in 1956 would have been $33.78 per acre
if production practices including farm organization and size had not
changed since 1910. This conclusion is based on the assumption that costs
of items used in wheat production in 1910 - 14 changed as much as items
in the production index, which is designed to indicate changes in general
farm production costs. In 1956 this figure stood at 290, almost three
times as high as in 1910 - 14. The significance of this comparison is
that, as measured by the production index, improved technology decreased
the real cost of producing wheat in this 46 year period by 30 percent,
$33.78 less $23.63.

CHAPTER VI

BUDGETS OF 1956 COSTS USING DIFFERENT FARM ORGANIZATIONS

The 1956 average cost considered so far is only a single point on the average cost curve. Partial budgets of farms with different organizations provide additional information about the shape of the long-run average cost curve.

The cost of farming 240 acres, 480 acres, and 640 acres by owning all equipment and by custom harvesting is compared with the cost using custom rates (Table XII). The cost of farming 240 acres by owning all equipment was higher than the custom rates. All other plans budgeted were less than the custom rates. The cost of farming 480 acres by custom harvesting was slightly more than the cost by owning harvesting equipment. The custom harvesting cost on the 640 acre farm was $0.52 more than the cost by owning all equipment. Farming 480 acres appears to be about the break-even acreage for owning harvesting equipment or using custom work.

The range in the budgets point out the large variability between farms. The lowest cost was only 59 per cent of the highest. The actual variation between farms would be even greater than this due to larger differences in farm size, greater variation in equipment investment, and differences in operator efficiency. The per bushel costs would have a still greater range due to yield variability.

The average labor and machinery cost of producing an acre of

TABLE XV

LABOR AND MACHINERY COST PER ACRE OWNING EQUIPMENT
AND USING CUSTOM RATES

	240 acres 3 plow Tractor	480 acres 3 plow Tractor	480 acres 4 plow Tractor	640 acres 4 plow Tractor
Preharvest labor (tractor hours ≠ 5%) @ $1.00 hour	$ 2.28	$ 2.28	$ 1.39	$ 1.39
Harvest labor @ $1.00 hour	.56	.56	.56	.56
Preharvest machinery operating cost	2.01	2.01	1.49	1.49
Preharvest machinery fixed cost	2.00	1.00	1.72	1.29
Harvest machinery operating cost	.91	.91	.91	.91
Harvest machinery fixed cost	4.78	2.39	2.39	1.79
Total labor & Machinery cost owning all equipment	$12.54	$ 9.15	$ 8.46	$ 7.43
Cost using contract harvest rates $3.00 acre combining $0.92 acre hauling	$10.21	$ 9.21	$ 8.52	$ 8.09

Cost using custom rates[1]

Plow	2.40
Spring tooth harrow 3 times	3.00
Drill	1.00
Combine	3.00
Haul 13.2 bushels 5 miles	.92
Total	$10.32

[1] Rates from: E. A. Tucker, Odell L. Walker and D. B. Jeffrey, Custom Rates for Farm Operations in Oklahoma, July, 1956, pp 12-14 Rates were for North Central Oklahoma.

wheat in 1956, adjusted to average yield, was $10.37. This cost is about the same as the cost of farming 240 acres by custom harvesting. The budgeted costs for farming larger acreages were less than the average farmer cost. This indicates that the average farmer cost in 1956 was high on the downward sloping part of the average cost curve due to the relatively small size of farm. This condition is illustrated by farm SAC_2 in Figure 2, page 3. This condition of low costs on the large farms makes the average cost per bushel lower than the average farmer cost.

The budgets indicate that it is possible to reduce the average cost by farming larger acreages. Farming larger acreages also provides the operator more labor income.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Methods. Data for this study were obtained from Garfield County
farm accounts and cost studies made in the area. Interviews with
Garfield County farmers provided additional information. The cost of
wheat production was estimated from Garfield County farm account
records by assuming that wheat expenses were the same percentage of
total expenses as wheat receipts were of total receipts and by as-
suming that costs in enterprises other than wheat equaled the ex-
penses in these enterprises. These same methods were used in esti-
mating expenses on wheat farms in the Southern Plains. The costs ob-
tained by different methods are compared to show the effect of other
enterprises on reducing the cost of wheat production. Partial budgets
for farming different acreages and for using custom rates and various
equipment were made to learn more about the average costs in 1956.
The effect of yield and wheat price changes on the cost of production
was calculated.

Findings. The average cost of producing wheat in Garfield County
in the periods studied adjusted to 1956 prices and using average yields
was:

	1910-14	1920	1931	1940	1956
Per acre	$33.78	$33.79	$18.48	$19.54	$23.60
Per bushel	2.56	2.94	1.40	1.48	1.79

The cost in this area has not increased as much as the United
States index of prices paid by farmers for living and production

(parity index) or the United States index of prices farmers pay for production items.

Budgets showed that the 1956 average cost could be reduced by balancing equipment investment with acreage requirements and using custom work. These budgets also showed that costs on large farms were less than on smaller farms.

The expenses obtained from farm accounts were generally higher than the expenses computed on the basis of labor and material requirements. Per acre wheat production costs using the farm account methods were generally higher in Garfield County than in the Southern Plains.

The average wheat yield per planted acre in Garfield County from 1919 to 1956 was found to be 13.2 bushels. A regression analysis using time as the independent variable and yield as the dependent variable showed that the yield has not increased significantly between 1919 and 1956.

The labor requirements for producing wheat decreased from 10.6 hours in 1910 - 1914 to 2.7 hours in 1956. This decrease in labor requirements occurred even though more operations were performed in 1956.

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APPENDIX TABLE I

OKLAHOMA SEASON AVERAGE WHEAT PRICE

Year	Price per bushel	Year	Price per bushel
1909	$ 1.06	1933	$ .68
1910	.89	1934	.81
1911	.88	1935	.86
1912	.79	1936	.99
1913	.76	1937	.96
1914	.87	1938	.56
1915	.97	1939	.65
1916	1.38	1940	.62
1917	2.10	1941	.93
1918	2.01	1942	1.11
1919	2.10	1943	1.38
1920	1.84	1944	1.39
1921	.99	1945	1.45
1922	.92	1946	1.80
1923	.88	1947	2.17
1924	1.07	1948	1.98
1925	1.46	1949	1.87
1926	1.16	1950	2.02
1927	1.25	1951	2.20
1928	1.04	1952	2.12
1929	.96	1953	2.13
1930	.68	1954	2.15
1931	.33	1955	2.05
1932	.32	1956	2.00

Source: 1909 - 1947 data, A Statistical Handbook of Oklahoma Agriculture, Oklahoma Agricultural Experiment Station Miscellaneous Publication 14, 1949, p. 15.

1948 - 1956 data, Agricultural Prices, Agricultural Marketing Service, United States Department of Agriculture, Washington, (various issues).

APPENDIX TABLE II

UNITED STATES INDEX NUMBER OF PRICES 1910 - 1914 BASE

Year	Production items [a]	Parity index [b]	Year	Production items	Parity index
1910	95	97	1934	119	120
1911	97	98	1935	123	124
1912	102	101	1936	124	124
1913	102	101	1937	133	131
1914	104	103	1938	126	124
1915	106	105	1939	124	123
1916	117	116	1940	126	124
1917	152	148	1941	134	133
1918	176	173	1942	153	152
1919	193	197	1943	174	171
1920	204	214	1944	187	182
1921	149	155	1945	196	190
1922	150	151	1946	212	208
1923	161	159	1947	242	240
1924	163	160	1948	266	260
1925	165	164	1949	257	251
1926	162	160	1950	264	256
1927	162	159	1951	292	282
1928	167	162	1952	299	287
1929	166	160	1953	286	279
1930	156	157	1954	286	281
1931	134	130	1955	286	281
1932	116	112	1956	290	285
1933	110	109			

a
Index numbers of prices paid by farmers for production items, by groups, United States, 1910 - 1956, commodities, interest, taxes, and wage rates.

b
Index numbers of prices paid by farmers, interest taxes, and wage rates.

Source: Agricultural Prices, Agricultural Marketing Service, United States Department of Agriculture, (Washington, October 15, 1956).

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