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# WHEAT PRODUCTION COSTS PER BUSHEL FOR WHEAT-FALLOW, THREE YEAR ROTATION AND CONTINUOUS CROPPING, NEBRASKA 1978-79

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located at the Panhandle Station at the time this research was done.



## Introduction

In 1978 Nebraska farmers produced approximately 77.7 million bushels of winter wheat on dryland acres. The three basic production systems used were wheat fallow (2-yr. rotation), wheat-fallow- corn or sorghum often referred to as the three year rotation, and continuous wheat.

Detailed production cost studies assist wheat growers in comparing their operation costs to other growers with similar production conditions and acreages of wheat. Cost of production information is a function of yield, variable cash costs, fixed costs, and the acres of wheat produced. A study of this type estimates production costs at one point in time. Annual revision of production cost figures is necessary as fuel and other input prices change.

## Objective

The objective was one of gaining an accurate estimate or representative set of cost of production figures for the various production systems used in wheat production in the state of Nebraska.

Potential cooperators were contacted initially by county agents or by a Nebraska Wheat Grower Association members in February and March, 1978. Those growers included in the survey were selected on their production system, acres of wheat, and their willingness to cooperate and record cost information on their tillage, planting and harvesting operations.

A follow up letter, tillage recording book, and survey forms were mailed to each selected wheat grower in April, 1978. The growers recorded harvest data for the 1978 crop and all the tillage operations



and costs incurred on the crop to be harvested in 1979. The final interview was conducted in October and November of 1978 and February and March of 1979. At this time all the data was transferred from the grower records to the final survey form. Growers were also questioned with regards to their proposed 1979 harvest so that the cost could be included in their 1979 wheat crop budgets.

### Wheat Rotations Studied

Three systems were studied: the wheat-fallow rotation (2-yr. rotation), the three year rotation, and the continuous cropping rotation. Counties were selected based upon the quantity of wheat produced, the production system prevalent, and a general knowledge of the size of wheat operations measured in acres of wheat per farm in the county.

The wheat fallow system (2-yr. rotation) data was obtained from 22 growers located in Cheyenne, Deuel, Scotts Bluff, Kimball, Hitchcock, Morrill and Perkins Counties. The three year rotation system included data from 12 producers in Red Willow, and Harlan Counties. The continuous cropping system data was obtained from six Saline County producers. Figure 1 shows the three areas and the number of wheat growers surveyed in each county.

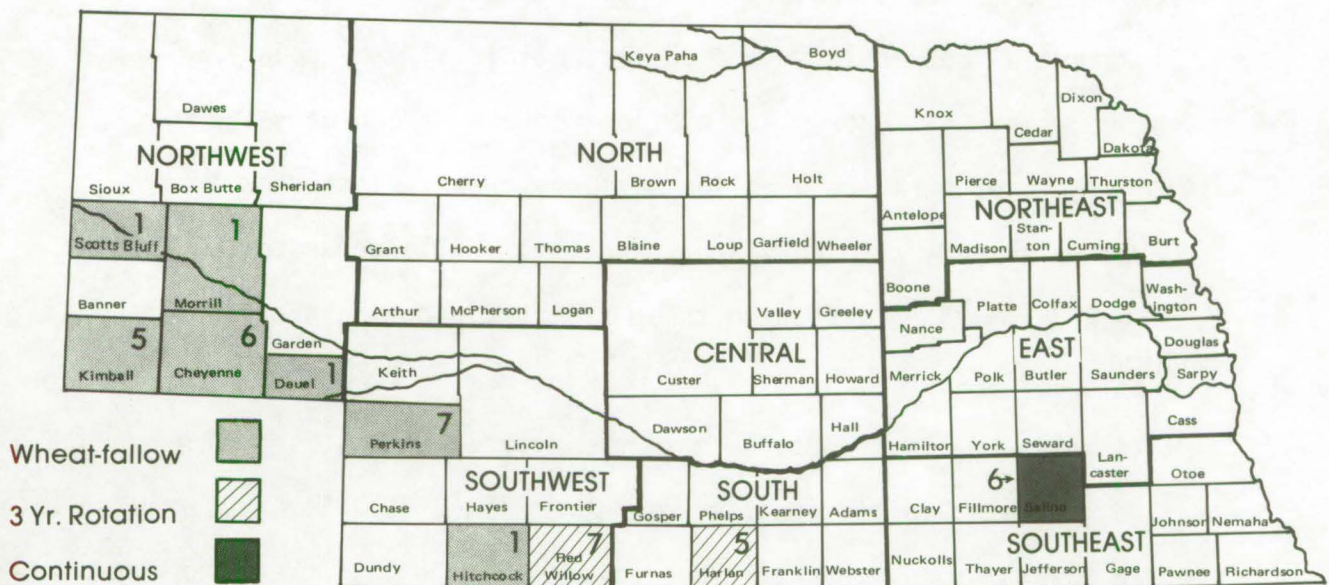


Figure 1. Production area involved and number of wheat growers from each county included in the 1979 wheat production cost study.

Table 1 shows the forty producers by size of wheat enterprise and wheat production system. For the farms surveyed, the percent of wheat of wheat of the total crop acres decreased from 88.5% in western Nebraska to 34.5% for eastern Nebraska. The average acres of wheat per farm decreased from 797 acres in the two year rotation to 170 acres in the continuous rotation.

Table 1. Number of wheat cooperators by size of wheat enterprise and wheat production system 1978-79.

Size Class No.		Two year	Rotation 3-year	Continuous
1	Less than 200 Acres	2	2	5
2	200-349 Acres	3	6	1
3	350-799 Acres	7	4	0
4	More than 800 Acres	10	0	0
	Total Number of Producers	22	12	6
	Average size Wheat Acres	797	338	170
	Wheat of total crop acres	88.5	64.7	34.5

### Cost Accounting Procedures

#### Fixed Costs

1. The wheat enterprise share of the depreciation allowances for machinery, machinery storage, and repair facilities were based on the actual amounts of depreciation taken on the cooperators 1978 income tax returns. The 20 percent additional first year depreciation was included only on those machines for which it was actually claimed. Equipment



that was depreciated out but still used in the wheat operation received no allowance.

2. Interest on the wheats share of the machinery, machinery storage and repair facilities was calculated at 9 percent of the sum of the undepreciated balance and salvage value. The undepreciated value plus salvage represented the unused portion of the investment.

3. Insurance on the wheat's share of the equipment, machinery storage and repair facility was determined by the summation of the purchases prices including value of trade in and multiplying by one percent.

4. License, personal taxes and insurance for pickup(s) and truck(s) were the actual amounts paid by the grower obtained from his records for a period of one year.

5. A land charge was not included in the initial cost of production calculations as the assumption was made that all producers were tenant. That is the cost of production per bushel was calculated on the tenant's cost and on the tenant's share of the crop. Under the common share lease arrangements the fertilizer and herbicide materials are shared the same as the wheat crop.

Four alternative land charges were then examined with the charges added to the tenants costs and based on the total production. The four alternative land charges were: a.) land charge based on current value at 9 percent interest and 1 percent allowance for taxes plus the landlord's cost of shared items.<sup>1</sup>; b.) land charge based on current value

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<sup>1</sup> The current value of land and cash rents were taken from a February 1979 survey pages 28 and 32. Johnson, Bruce and Ronald Hanson, Nebraska Farm Real Estate Market Developments in 1978-79. Department of Agricultural Economics Report No. 97, June 1979. IANR University of Nebraska-Lincoln.

at 6 percent interest and 1 percent allowance for taxes plus landlord's cost of shared items; c.) cash rent per harvested acre with fertilizer, herbicide and other shared items at their total cost per acre; and d.) the landlord's share of the crop multiplied by an assumed price of wheat in July of 1979 minus the landlord's share of fertilizer and other shared items. This latter figure represents a return residual to pay interest on the investment and taxes.

#### Variable Costs

1. Seed Costs per acre was based on the rate sown per acre times the cost per bushel of the seed wheat.
2. Actual Costs of fertilizer and herbicides were taken from the producers recorded data. In the case where only a portion of the wheat received fertilizer the cost of fertilizer and herbicides were prorated over the total acres of wheat planted.
3. Custom machine hire rates were those rates actually paid and recorded by the producer. Custom machine hire was basically for custom combine and hauling at the time of harvest.
4. Repairs and supplies related to wheat were taken from his 1978 recorded data or if the surveyed grower was not able to produce an accurate estimate 5.5 percent of the wheat's machinery investment was the assumed allowance.
5. Miscellaneous costs were taken from actual recorded data. This cost was the allowance for farm record expenses, income tax preparation,

professional services, telephone, electrical services for welders, grinders and shop lighting, subscriptions, grower dues bank charges, postage, and farm office.

6. Auto allowance was calculated at \$.17 per mile for those miles estimated by the grower to be associated with the wheat enterprise.

7. Fuel costs for tractors and combines were based on the Nebraska on-farm fuel use survey. The survey gives average fuel consumption for tillage and harvesting operations. Oil, lubricants, oil filters, air filters were charged at the rate of 10 percent of the calculated fuel costs. Diesel fuel was charged at the rate of \$.75 per gallon (no tax included) and gasoline at \$.97 per gallon (tax included). The state and federal gasoline taxes were subtracted for any gasoline used for non-highway use. Fuel, oil, and filter costs for the truck(s) and pickup(s) were based on the assumed average rate of consumption of five and ten miles per gallon, respectively. The grower estimated their annual mileage associated with the production of wheat.

8. The labor input consisted of the calculated field time plus the growers estimate of overhead. The field time was based on machine performance. Machine performance was based on the speed of travel, field efficiency, and the size of equipment. The size of equipment and speed of travel were obtained from the survey data. The overhead allowance was for equipment preparation, moving equipment from field to field, purchasing parts and supplies, record keeping, and other wheat related activities. Labor was calculated for hauling grain from the combine to the first storage facility. This labor was based on the number of loads of wheat produced and the distance to the bins or commercial elevator. Truck travel was estimated at 40 miles per hour.

Labor was estimated for pickup use. The mileage driven for wheat was divided at the assumed speed of 40 miles per hour to arrive at the time involved. All labor was calculated at \$5.00 per hour.

9. The management input costs per acre were estimated at \$.20/ bushel and multiplied by the established ASCS yield. The ASCS yield was assumed to represent the long term yield for each producer surveyed. Management was assumed to be contributed 100 percent by the operator.

10. The interest on the operating expenses was charged at the rate of 9.5 percent for a period of one year. Labor and management charges were not included as an operating expense for this calculation.

#### Results of this 1978-79 Wheat Cost Analysis by Rotation

The average 1978-79 budgeted costs for each rotation are presented in table 2. Assuming all surveyed producers were in a tenant-landlord arrangement and basing the costs on the tenant's share of the ASCS yield, the budgeted costs were \$2.93, \$3.16, and \$3.42 per bushel for the two year, three year, and continuous rotations respectively. The simple average cost of the three rotation systems was \$3.17 per bushel.

Fixed costs ranged from \$19.34 to \$22.96 per acre. The wheat-fallow (2 year rotation) had the lowest fixed costs per acre. The specialization of the growers in wheat and their average acres of wheat per farm surveyed in the 2 year rotation explains the lower fixed cost per acre.

Total variable costs ranged from \$48.78 to \$55.50 per acre. The two year rotation had the lowest total variable cost as fertilizer costs were approximately one-third the cost of the three year and continuous

Table 2. Budgeted cost per acres and per bushel for the tenant share of crop using a two year rotation, three year rotation and the continuous rotation, Nebraska 1978-79.

	2 year	Rotation 3 year	Continuous
<u>Fixed Costs</u>			
Depreciation	\$12.26	\$14.63	\$15.52
Interest on undepr. balance @ 9%	5.45	5.14	5.74
Insurance on equipment	1.26	1.49	1.26
Truck license, tax., ins.	.37	.57	.45
TOTAL FIXED COSTS/AC	\$19.34	\$21.83	\$22.96
<u>Variable Costs</u>			
Seed	\$ 3.08	\$ 4.07	\$ 5.22
Custom hire	4.58	1.38	--
Crop Insurance	1.51	.67	.44
Fertilizer & herbicide*	3.68	9.14	9.55
Repairs	7.38	7.44	6.41
Fuel & oil	9.13	9.84	8.80
Miscellaneous - overhead costs	1.82	1.51	1.74
Auto allowance	.53	.24	.52
Operating interest @ 9.5%	2.99	3.25	3.10
Labor	7.10	10.63	8.63
Management	6.98	7.33	7.23
TOTAL VARIABLE COSTS/Ac	\$48.78	\$55.50	\$51.64
Total cost/Ac	\$68.12	\$77.33	\$74.60
ASCS Yield (Bu)	34.86	36.67	36.17
Tenant's share (Bu)	23.25	24.44	21.80
Cost/bu based on tenants share of crop	\$2.93	\$3.16	\$3.42

Source: Survey data and budgeting.

rotations. Labor cost per acre was lower in the two year rotation system reflecting the larger size of equipment used in the wheat-fallow system. Seeding cost reflected the lower seeding rate (45 lbs/ac) in the two year when compared to the 75-90 lbs sown in the continuous rotations. Seed wheat values were lower in the two year rotation area reflecting the lower market prices of weatern Nebraska compared to eastern Nebraska.

Table 3 adds to the tenant's cost the costs provided by the landlord. Basically the tenant is going to become the owner of the land and will view the land charge using four alternative methods. These four alternatives are A.) current value of land multiplied by 10 percent (9 percent interest plus 1 percent taxes); B.) current value of land multiplied by 7 percent (6 percent interest plus 1 percent taxes); C.) cash rent per harvested acre; and D,) value of landlord's share of crop.

Table 3. Cost of production per bushel for wheat production by rotation using four alternative land charges - Nebraska 1979.

	Wheat fallow	3-year rotation	Continuous
a) Current value of land @ 9% interest & 1% taxes <sup>a</sup>	4.20 <sup>b</sup>	4.13	4.47
b) Current value of land @ 6% interest & 1% taxes	3.54	3.56	3.80
c) Cash rent <sup>c</sup>	2.92	3.26	3.65
d) Value of landlord's share of crop <sup>d</sup>	3.13	3.25	3.40



The land value for alternative A and B was \$383 per acre with 2 acres of cropland needed to produce 1 harvested acre in the wheat fallow area, \$464 per acre in the 3-year rotation with 1.5 acres needed annually to produce 1 acre of harvested crop, and \$808 per acre in the continuous cropping area. In this latter case, 1 cropland acre was equal to the harvested acres. Cost of production per bushel for alternative A and B includes shared items, that is total cost of fertilizer and herbicides per acre are now included rather than just the tenants share.

Average cash rents per harvested acre paid in 1979 were \$32.00, \$37.50, and \$51.00 per acre for two year, 3-year rotation, and continuous cropping, respectively. The cash rent values, landlord's cost of shared items, plus total cost per acres of tenant (table 2) divided by ASCS yield per acre equals cost of production per bushel.

The landlord's bushel share was multiplied by \$3.70, \$3.80, and \$3.90 per bushel for the 2-year rotation, 3-year rotation, and continuous cropping areas, respectively. From this figure the landlord's cost of shared items was subtracted to arrive at the land charge. This land charge is a return to land and taxes.

The total cost per bushel increased from a tenant arrangement without a land charge to one with a land charge in all but two instances. Using the 10% allowance of the current value for the return to the investment and the taxes resulted in total cost per bushel of \$4.20, \$4.13 and \$4.47 for the two year, three year and continuous rotations respectively. Using the 7 percent allowance as a land charge instead of the 10 percent results in a decrease of \$.57 to \$.67 per bushel.

Using cash rent as an alternative land charge results in cost of pro-

duction per bushel of \$2.92, \$3.26 and \$3.65 per bushel for the 2 year, 3 year, and continuous rotations respectively.

The value or market price of wheat and the yield determines the land charge in the fourth method of calculating a land charge. Using a price ranging from \$3.70 to \$3.90 per bushel to reflect the differential present in the state the cost per bushel was \$3.13, \$3.25 and \$3.40 for the 2 year, 3 year and continuous rotations.

#### Summary

Cost of production figures were budgeted to represent the tenant's cost. To the tenant's cost four alternative land charges were added in order to estimate the total cost of wheat production. Budgeted costs for the tenant were \$2.93, \$3.16, and \$3.42 per bushel for two year, three year, and continuous cropping rotations, respectively. Adding the land charge at current values, and allowing 10 percent for interest and taxes increased the cost of production to \$4.20, \$4.13 and \$4.47 per bushel for the 2-year, 3-year, and continuous rotations.

Since wheat growers are in a dynamic setting of changing costs for factor of production, their cost need to be reviewed annually in order to obtain current cost data for their wheat enterprise.

#### Adjustment in the Cost of Production When Due to Changes In Costs

Since the survey was taken for the wheat crop planted in 1978, some dramatic changes in costs have taken place. The price of energy has continued to increase at a steady pace. Diesel fuel is approaching \$1.00 per gallon (no tax included) and gasoline \$1.30 per gallon (tax included) for farm delivery. Interest rates from September 1979,

through the first half of 1980 went from 9 to 18 percent for short term operating capital. Land values and new machinery likewise have continued to increase since the survey was conducted.

Using some general statements based on average cost for selected items, adjustment to the data can be made as follows: For each 1 percent increase in the interest rate the cost of production based on a yield of 36 bu. per acre is increased by approximately 1¢/bu. For each ten cent increase in the cost of fuel the cost of production per bushel increases approximately 3¢.

For each \$1.00 increase in labor costs the costs per bushel increases approximately 4¢ based on 36 bushel and 1½ hrs. of labor needed to fully take care of one acre of harvested wheat.

For each 10 percent increase in machinery values and each 1% increase in interest rates for financing equipment use a depreciation rate of 10% and figuring the interest on the average investment results in an acreage similar to those of the study results in a 1¢/bushel cost of production increase.

Increases in land values of \$100 per acre results in an increase of \$.28, \$.42, and \$.57 for the continuous, three year and two year rotations respectively, using alternative A (10 percent charge x current value) for the calculation and a yield of 36 bu. per acre. The differences in the costs per bushel reflect the acres involved in the production of one harvested acre of wheat.



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