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## An Evaluation of Costs of Ownership, Custom Work, and Leasing Arrangements of Farm Equipment Applicable to Dryland Farming in Box Elder County, Utah

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AN EVALUATION OF COSTS OF OWNERSHIP, CUSTOM WORK, AND  
LEASING ARRANGEMENTS OF FARM EQUIPMENT APPLICABLE  
TO DRYLAND FARMING IN BOX ELDER COUNTY, UTAH

by

Ray H. Finch

Report No. 2 submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

Agricultural Economics

Plan B

Approved:

UTAH STATE UNIVERSITY  
Logan, Utah

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## INTRODUCTION

Today profitable dry farming requires a considerable amount of machinery and equipment. Many farm management people, creditors in agriculture production and farmers themselves recognize that a high percentage of gross income is spent on machinery and equipment. Machinery expense represents the largest expenditure on dryland farms in Box Elder County.

Farms in the county are relatively small, but even on the smaller farms most farmers have a complete line of farm machinery. In most cases, the machinery is not used anywhere near its maximum.

Some Box Elder operators are hiring custom work but it is not a general practice and does not seem to be very popular with even the small farmers.

There was no leasing of farm equipment in the county at the time of this study. However, farm machinery dealers have offered such service when enough interest was present.

Farm mortgage delinquency is high in Box Elder County. Part of this problem results from too much investment in farm machinery. Many farms have enough equipment to care for double or triple their present acreage. The farmers low sales resistance coupled with steady pressure by salesmen to buy more and newer equipment aggravate the problem.

Neither the Extension Service or the Department of Agriculture

Economics of Utah State University have made any concerted effort to assist farmers with this serious economics problem. However, the seriousness of this situation, not restricted to Box Elder county only, justifies an attempt to determine the most economical means of doing farm work.

#### Objectives

The objectives of this study were:

1. To determine farming costs when the farm operators own their own equipment.
2. To determine costs when the farm operator hires custom work.
3. To determine costs when farm equipment is leased.
4. To analyze and compare costs associated with the three operating methods on a small (300 acres of crops), on a medium unit (600 acres of crops) and on a large unit (900 acres of crops).

## METHODS OF PROCEDURE

To compare costs of the three different methods, three model farms with similar land was used. This soil was of silty clay loam texture, and had only moderate slope. A prairie type combine and wheel tractors was satisfactory for all acres. The models had grain each year of 300, 600 and 900 acres. Each farm also had equal acres in fallow each year that was cropped.

The cultural and production practices were carried out in the same manner for each model. The cultural practices used were: (1) plowing with a noble blade 6 inches deep; (2) digging with a graham holmedigger 6 inches deep; (3) two weedings with a rod weeder, 3 inches deep; (4) planting with a deep furrow drill; (5) spraying one third of the crop for weeds each year with a boom type sprayer; (6) combining with a 16 foot self-propelled prairie type combine; (7) trucking grain and seed with a 2½ ton truck; (8) and using a 3/4 ton pickup for transportation; the source of power is wheel tractors from 90 to 120 horse power rating.

Labor was included with each operation as it was impossible to separate labor costs from custom work.

Type of operations and methods used were those that were considered as most typical for the county, these are listed above. They were computed the same way in each model operation, to keep costs on a comparable basis.

Equipment used on the different sized farms were as similar as

possible. Only equipment size was increased on the larger farms.

The different methods, ownership, custom work and leasing, of doing farm machine work were applied to the 300, 600 and 900 acre model farms to compare the costs on the different sized units and determine what was the most efficient method for each of the models.

#### Source of Data

Information was secured from farmers by personal contact on (1) tractor and combine fuel costs, (2) taxes on equipment, (3) machinery insurance, (4) cost of equipment, (5) interest rates on machinery loans, (6) amount of time required to do various jobs, (7) typical equipment size and (8) custom work rates.

Data were gathered from farm machinery dealers as to equipment, interest and leasing costs.

Information on cost of repairs, truck leasing rates and taxes on machinery was taken from Doanes Agricultural Report, 1960<sup>1</sup> and Economics of Leasing Farm Machinery and Buildings.<sup>2</sup>

Power ratings and fuel consumption data were taken from The 1961 Nebraska Tractor Lists.<sup>3</sup>

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<sup>1</sup>Doanes Agricultural Report, 1960.

<sup>2</sup>Economics of Leasing Farm Machinery and Buildings, Bulletin No. 450, September, 1964. Department of Agriculture Economics, Agriculture Experiment Station, North Dakota State University, Fargo, North Dakota.

<sup>3</sup>The Nebraska Tractor Lists, January 1, 1966. The Agricultural Experiment Station, University of Nebraska College of Agriculture and Home Economics.



A method to determine the number of annual use units to justify ownership of farm equipment was taken from Custom Rates for Farm Operations in Wyoming.<sup>4</sup>

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<sup>4</sup>Custom Rates for Farm Operations in Wyoming. Mimeo Circular No. 178, Agricultural Experiment Station, University of Wyoming, Laramie, Wyoming.

## METHODS OF OPERATION

### Ownership

A study of machinery ownership costs was made for the 300, 600 and 900 acre models.

Ownership costs for machine work declined as the unit size increased. This resulted because a complete line of equipment was needed to carry out all of the farming operations but the equipment was not used to its maximum capacity on the smaller units. Thus, the investment per acre was much higher for small farms, which in turn increased the fixed costs which are a major part of total expenses.

Equipment depreciates at nearly the same rate regardless of use because obsolescence and weathering reduces its value.

Machine work costs were computed for the small farm of 300 acres and both costs of machine work and average investment per acre are expressed in table 1. This same process was followed for the medium size unit of 600 acres (table 2) and for the 900 acre model (table 3).

#### 300 acre model

Per-acre machine-ownership costs for the 300-acre model were \$23.00 per acre and the total costs of machine operation per year was \$6900. The average investment per acre was \$57.67 (table 1).

Table 1. Costs and investment of farm equipment under the ownership basis with 300 acres of crops per year

Item	Description	Machine expense Dollars	Cost per acre Dollars	Hours used	Tractor charge Dollars	Tractor, labor and machine cost Dollars	Tractor, labor and machine per acre cost Dollars	Average investment per acre Dollars
Plowing	8' noble	124.00	.41	100	858.00	982.00	3.27	1.42
Tractor	4020 J.D.	(850.00)		262	(2096.00)			14.16
Digging	24' G.H.	379.00	1.06	50	429.00	808.00	2.69	4.00
Weeding (twice)	24' rod	144.00	.48	60	429.00	573.00	1.91	1.50
Drilling	200"	272.00	.91	42	307.00	579.00	1.93	3.00
Sprayer 1/3 acreage	21' boom	56.00	.18	10	72.00	128.00	.43	.94
Miscellaneous tools	small	188.00	.63	--	--	188.00	.63	3.33
Combining	16 ft.	1780.00	5.93	100	--	1780.00	5.93	16.66
Trucking	2½ ton	1142.00	3.81	120	--	1142.00	3.81	8.33
Transportation pickup	¾ ton	720.00	2.40	600 miles	--	720.00	2.40	4.33
<b>Total</b>		<b>4805.00</b>	<b>16.01</b>		<b>2095.00</b>	<b>6900.00</b>	<b>23.00</b>	<b>57.67</b>

Table 2. Costs and investment of farm equipment under the ownership basis with 600 acres of crops per year

Item	Description	Machine expense Dollars	Cost per acre Dollars	Hours used	Tractor charge Dollars	Tractor, labor and machine cost Dollars	Tractor, labor and machine per acre cost Dollars	Average investment per acre Dollars
Plowing	14' noble	205.00	.34	1500	1089.00	1294.00	2.16	1.00
Tractor	5010 J.D.	(2450.00)	(4.06)	3600				10.00
Digging	36' G.H.	614.00	1.02	750	544.00	1158.00	1.93	3.00
Weeding (twice)	42' rod	237.00	.40	750	454.00	691.00	1.15	1.10
Drilling	300"	455.00	.76	600	363.00	818.00	1.36	2.20
Spraying	21' boom pickup	67.00	.11		--	67.00	.11	.25
Combining	16 ft.	2717.00	4.53	2000	--	2717.00	4.53	10.83
Trucking	2½ ton	1249.00	2.08	2400	--	1249.00	2.08	4.16
Transportation	pickup ¾ ton	823.00	1.37	--	--	823.00	1.37	2.17
Misc. tools	small	285.00	.48	--	--	285.00	.48	2.38
<b>Total</b>		<b>6652.00</b>	<b>11.09</b>		<b>24.50</b>	<b>9102.00</b>	<b>15.17</b>	<b>37.09</b>
Percent of small farms							66 %	

Table 3. Cost and investment of farm equipment under ownership basis with 900 acres of crops per year

Item	Description	Machine expense Dollars	Cost per acre Dollars	Hours used	Tractor charge Dollars	Tractor, labor and machine cost Dollars	Tractor, labor and machine per acre cost Dollars	Average investment per acre Dollars
Plowing	14' noble	206.00	.23	2500	1723.00	1929.00	2.14	.67
Tractor	5010 J.D. (3630.00)		(4.03)	5600				6.67
Digging	36' G.H.	650.00	.72	1100	758.00	1408.00	1.56	2.00
Weeding	42' rod	250.00	.28	1100	631.00	881.00	.98	.75
Drilling	300"	489.00	.54	900	517.00	1006.00	1.12	1.50
Spraying	21' boom	73.00	.08	pickup	--	73.00	.08	.16
1/3 acreage								
Combining	2-16 ft.	4380.00	4.87	3000	--	4380.00	4.87	11.11
Trucking	2-2½ ton	1490.00	1.66	4000	--	1490.00	1.66	5.56
Transportation	pickup	905.00	1.01	--	--	905.00	1.01	1.44
Misc. tools	3/4 ton small	330.00	.36	--	--	330.00	.36	.89
Total		8773.00	9.75		3629.00	12402.00	13.78	30.75
Percent of small farm								53%

600 acre model

Per-acre machine costs for the 600 acre model where machinery was owned dropped to \$15.17 (table 2). This was 66 percent of the 300-acre model. Investment in machinery declined to \$37.09 per acre. Total cost of all machine operations for the year was \$9102.00 (table 2).

900 acre model

Machinery ownership costs for the 900 acre model farm were \$13.78 per acre which was 60 percent of the 300 acre model (table 3). Investment per acre was \$30.75, which represents 53 percent of the 300 acre model (table 3). Total cost of all machine operations for the crop year was \$12,402.00 (table 3).

Summary of Ownership Costs for the Model Farms

Costs of operation dropped rapidly from the 300 acre unit to the 600 acre unit, but only slightly from the 600 acre model to the 900 acre model. Thus it seemed that the 300 acre model was a very inefficient unit as far as equipment use was concerned. Evidently, the 600 and 900 acre units were much more efficient. The fixed costs caused inefficiencies on the small unit. These are items that remain the same regardless of the number of acres the machine covers. They include taxes on machinery, insurance, interest on investment and depreciation.

Small operators might have reduced fixed costs per acre by doing some custom work and thus spread these costs over more acres.

Custom Work

There were some people in the area who did custom work. They contracted to do machine work for farm operators for a certain price per acre.

We recognized that certain requirements must be met before custom work costs could be compared to machinery ownership costs. These requirements were:

- (1) The work had to be available when needed.
- (2) The operator had to be dependable and efficient.

Custom rates were quite variable within the county. Part of this resulted from a difference in the work quality of different operators and the distance that the operator had to move his equipment. An average of the different rates was used to determine the charge per acre. Cost figures were taken from farmers and custom operators.

Besides being an economical method of getting machine work done, there were other advantages to custom work. Part-time farmers did not need to be available when the work was done and no investment in machinery or buildings to house the equipment was required.

300 acre model

Machine work done on the custom basis for the 300 acre model was \$17.30 per acre (table 4). Total machine costs for the crop year was \$51.90 (table 4).

Table 4. Cost of machine work by custom method with 300, 600 and 900 acres of crops per year<sup>a</sup>

Item	300 acres		600 acres		900 acres	
	Cost per acre	Total cost	Cost per acre	Total cost	Cost per acre	Total cost
Flowing (noble)	3.25	975.00	3.00	1800.00	3.00	2700.00
Digging (G.H.)	2.25	675.00	2.00	1200.00	2.00	1800.00
Weeding (rod)	1.40	420.00	1.30	780.00	1.30	1170.00
Weeding (rod)	1.40	420.00	1.30	780.00	1.30	1170.00
Drilling	1.40	420.00	1.30	780.00	1.20	1080.00
Spraying (1/3 acreage)	.50	150.00	.45	270.00	.40	360.00
Combining	4.00	1200.00	3.75	2250.00	3.50	3150.00
Trucking	.75	225.00	.60	360.00	.50	450.00
Transportation <sup>b</sup>	2.35	705.00	1.37	822.00	1.01	909.00
<b>Total</b>	<b>17.30</b>	<b>5190.00</b>	<b>15.07</b>	<b>9042.00</b>	<b>14.21</b>	<b>12789.00</b>

<sup>a</sup>Based on rates obtained in Box Elder County, Utah.

<sup>b</sup>Custom work not practical, ownership figures have been used.

#### 600 acre model

Custom work costs per acre for all machine work was \$15.07 with a total cost of \$9042.00 for the crop year (table 4).

#### 900 acre model

Custom work costs per acre for all machine work was \$14.21 with a total cost of \$12,789.00 for the crop year (table 4).



Summary of Custom Work Costs for the Model Farms

The difference in costs for the three model farms with custom work was not significantly different. The per acre costs for the 300 acre model was \$17.30. The 600 acre model costs were \$15.07 per acre and the 900 acre model costs were \$14.21 (table 4). On a percentage basis, this was 100 percent for the 300 acre model, 87 percent for the 600 acre model and 82 percent for the 900 acre model.

The principle reason for the difference in machine work costs under the custom work basis was caused by the time required to move equipment. Thus, the smaller units are charged a higher rate per acre to offset the time lost in moving equipment from one place to another.

Leasing Method

Leasing equipment is a relatively new method by which a rental rate is paid for the use of equipment. It was not available in Box Elder county at the time of this study. However, it was being considered by some farm machinery companies. The rates charged for leasing farm equipment is generally the same throughout the nation.

Machine rates used in figuring costs for this method was taken from Bulletin No. 450, Economics of Leasing Farm Machinery and Guildings,<sup>1</sup> truck rates were taken from Doanes Agriculture Report, 1960.<sup>2</sup>

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<sup>1</sup>Bulletin No. 450, Economics of Leasing Farm Machinery and Guildings, Department of Agriculture Economics, Agriculture Experiment Station, Fargo, North Dakota.

<sup>2</sup>Doanes Agriculture Report, 1960.

These machine rates were based on new delivered retail price of the machine in the area it was used and were as follows:

1 percent for a 10 hour day

5 percent for 1 week

15 percent for 1 month

25 percent for 2 months

33 1/3 percent for 3 months

Heavy trucks leased at \$3.75 per hour.

No figures were available for pickup trucks so ownership cost figures were used.

Using the above listed rates, costs have been computed for all machine work for the model farms of 300, 600 and 900 crop acres per year.

Rental costs, gas, oil, lubrication, repairs and labor for all operations for a full crop year were included in these costs for each model.

Leasing, like custom work, required no investment in equipment but did require the operator to pay for labor, repair, gas, oil and lubrication.

#### 300 acre model

The cost per acre per year for machine work on a lease basis was \$22.68. Total costs for all machine work for the year was \$6804.00 (table 5).

#### 600 acre model

The costs per acre for this model was \$19.79. The total cost was

Table 5. Costs of machine work using the lease method for 300 acres of crops per year<sup>1</sup>

Item	Date	Hours used	Machine lease	Tractor lease	Gas, oil lubrication	Repairs	Labor cost	Total cost	Per Acre cost
			Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Drilling	9/15	30	128.00	242.00	30.00	19.00	45.00	464.00	1.54
Plowing (Noble)	9/1	100	270.00	808.00	106.00	60.00	150.00	1394.00	4.65
Digging	4/15	50	120.00	350.00	53.00	30.00	75.00	628.00	2.09
Weeding	6/15	30	45.00	350.00	30.00	18.00	45.00	488.00	1.63
Weeding	8/1	30	45.00	350.00	30.00	18.00	45.00	488.00	1.63
Spraying	6/1	10	3.00	20.00	3.00	1.00	15.00	42.00	.14
Combine	8/5	100	1200.00	--	60.00	40.00	200.00	1500.00	5.00
Trucking	8/5	110	825.00	--	75.00	30.00	165.00	1095.00	3.65
Transportation/pickup	12 mo. <sup>2</sup>		455.00	--	150.00	100.00	--	705.00	2.35
<b>Total</b>		460	3091.00	2120.00	537.00	316.00	740.00	6804.00	22.68

<sup>1</sup>Taking new delivered retail price of equipment, charges were 1 percent for a 10 hour day, 5 percent for 1 week, 15 percent for 1 month, 25 percent for 2 months and 33 1/3 percent for 3 months.

<sup>2</sup>Transportation is figured on an ownership basis, no lease figures available.

\$11,874.00. On a percentage basis this was 87 percent of the 300 acre model cost per acre. This data is found in table 6.

#### 900 acre model

The cost per acre with leasing was \$18.98. The total cost amounted to \$17,082.00 (table 7). On a percentage basis this was 84 percent of the 300 acre model.

#### Summary of Leasing Costs for the Model Farms

The difference in costs of the three model farms when leasing was used was not significantly different. The per acre costs for the three model farms were \$22.68 for the 300 acre model, \$19.79 for the 600 acre model and \$18.98 for the 900 acre model (tables 5, 6, and 7). Expressed as a percentage this was 100 percent, 87 percent and 84 percent, respectively.

Per acre costs under the leasing method did not decline rapidly as the size of the unit increased. This resulted because the machines were paid for only during the time the operator had them. The saving effected by the large farm model resulted from a lower charge per day as the time of use was increased.

#### Comparison of Costs for the Ownership, Custom and Leasing Methods

#### 300 acre model

Based on the assumption that machines were available when needed and the operators were dependable and efficient, custom work was the most economical method for the 300 acre model.

Table 6. Costs of machine work using the lease method for 600 acres of crops per year<sup>1</sup>

Item	Date	Hours used	Machine lease cost	Tractor lease cost	Gas,oil lubrication	Repairs	Labor cost	Total cost	Per acre cost
			Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Drilling	9/15	60	410.00	415.00	60.00	36.00	90.00	1011.00	1.69
Plowing (Noble)	9/1	200	180.00	1385.00	222.00	120.00	300.00	2207.00	3.68
Digging	4/15	100	360.00	1200.00	106.00	60.00	150.00	1876.00	3.13
Weeding	6/15	60	68.00	600.00	60.00	36.00	90.00	854.00	1.42
Weeding	8/1	60	68.00	600.00	60.00	36.00	90.00	854.00	1.42
Spraying	6/1	20	4.00	40.00	6.00	2.00	30.00	82.00	.14
Combining	8/5	200	1500.00	--	120.00	120.00	400.00	2140.00	3.57
Trucking	8/5	220	1650.00	--	150.00	60.00	165.00	2025.00	3.38
Transportation/pickup 12 mo. <sup>2</sup>			475.00	--	225.00	125.00	--	825.00	1.36
<b>Total</b>			<b>4715.00</b>	<b>4240.00</b>	<b>1009.00</b>	<b>595.00</b>	<b>1315.00</b>	<b>11874.00</b>	<b>19.79</b>

<sup>1</sup>Taking new delivered retail price of equipment charges were 1 percent for a 10 hour day, 5 percent for 1 week, 15 percent for 1 month, 25 percent for 2 months and 33 1/3 percent for 3 months.

<sup>2</sup>Transportation is figured on an ownership basis, no lease figures available.

Table 7. Costs of machine work using the lease method for 900 acres of crops per year<sup>1</sup>

Item	Date	Hours used	Machine lease	Tractor lease	Gas, oil lubrication	Repairs	Labor cost	Total cost	Per acre cost
			Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Drilling	9/15	90	270.00	692.00	90.00	54.00	135.00	1241.00	1.38
Plowing (Noble)	9/1	300	240.00	2308.00	328.00	180.00	450.00	3506.00	3.90
Digging	4/15	150	468.00	1560.00	159.00	90.00	225.00	2502.00	2.78
Weeding	6/15	90	108.00	960.00	90.00	54.00	135.00	1347.00	1.50
Weeding	8/1	90	108.00	960.00	90.00	54.00	135.00	1347.00	1.50
Spraying	6/1	30	9.00	60.00	9.00	3.00	45.00	126.00	.14
Combining	8/5	150	2621.00	--	180.00	180.00	600.00	3581.00	3.96
Trucking	8/5	160	1837.00	--	270.00	90.00	330.00	2527.00	2.81
Transportation/pickup	12 mo. <sup>2</sup>		465.00	--	300.00	140.00	--	905.00	1.01
<b>Total</b>			6126.00	6540.00	1516.00	845.00	2055.00	17082.00	18.98

<sup>1</sup>Taking the new delivered retail price of equipment, charges were 1 percent for a 10 hour day, 5 percent for 1 week, 15 percent for 1 month, 25 percent for 2 months and 33 1/3 percent for 3 months.

<sup>2</sup>Transportation is figured on an ownership basis, no lease figures were available.

Cost per acre was \$17.30 as compared to \$23.00 and \$22.68 for the ownership and leasing methods (table 8). Total costs for the three methods were \$5190.00 for custom work, \$6804.00 for leasing, and \$6900.00 for ownership (table 8). This was a saving of \$1710.00 above the ownership and \$1614.00 above the rental method.

We recognize, however, that a delay in the time of operation or poor quality of workmanship by the custom operator can reduce yields to such an extent that the savings can be lost through reduced crop yields.

In deciding whether to hire custom service for a particular job, one must compare the total fixed and variable costs with the total cost of custom service. The break-even point can be computed by:<sup>1</sup>

$$\begin{array}{l} \text{annual use (units)} \\ \text{to justify ownership} \end{array} = \frac{\text{annual fixed costs}}{\text{custom rate per unit minus variable cost per unit}}$$

To illustrate how the formula works, assume the following problem: A self-propelled combine, with a new cost of \$10,000 has annual fixed costs of \$1400. The variable costs are \$1.87 per acre. If the custom rate for combining grain is \$4.00, the break-even point is 657 acres.

$$\frac{\$1400}{\$4.00 - \$1.87} = 657 \text{ acres.}$$

If the farmer has more than 657 acres to combine, he can afford to own his own combine. If he has less than this amount, he should hire custom work.

#### 600 acre model

Custom work again was the cheapest method of performing machine

<sup>1</sup>Custom Rates for Farming Operations in Wyoming. Mimeo Circular No. 178, Agricultural Experiment Station, Univ. of Wyoming, Laramie, Wyoming.

Table 8. Costs of machine work for 300, 600 and 900 acre model farms with ownership, custom work and lease methods

Method	Ownership		Custom Work		Lease	
	Per acre	Total cost	Per acre	Total cost	Per acre	Total cost
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
300 acre model	23.00	6900.00	17.30	5190.00	22.68	6804.00
600 acre model	15.17	9102.00	15.07	9042.00	19.79	11874.00
900 acre model	13.78	12402.00	14.21	12789.00	18.98	17082.00

work. Per acre costs were \$19.79, \$15.47 and \$15.07 for leasing, ownership, and custom work (table 8). Total costs were \$11,874.00, \$9102.00 and \$9042.00 respectively (table 8). This was a saving of \$2832.00 above leasing and \$60.00 above ownership.

From these figures, it is evident that ownership and custom work are nearly equal in cost while leasing appears to be uneconomical. When costs of ownership and leasing are that close the value attached to having ones own equipment available when needed should be given preferable consideration.

#### 900 acre model

Ownership proved to be the cheapest method for this size unit because the equipment was put to greater use. Per acre costs were \$18.98, \$14.21 and \$13.78 for leasing, custom work and ownership (table 8). Total costs were \$17,082.00, \$12,789.00 and \$12,402.00 respectively. This was a saving of \$4680.00 above leasing and \$387.00 above custom work.



Again the value of having owned equipment available when needed would add still more value to the ownership method and make it even more preferable than the costs indicate.

## CONCLUSIONS

Custom work is the most economical method of machine work for the 300 acre model farm. Cost per acre was \$17.30 for custom work, \$22.68 for the leasing method and \$23.00 for ownership.

Custom work and machine ownership were nearly equal on the 600 acre model farm. The costs per acre were \$15.07 for custom work, \$15.17 for ownership and \$19.79 for the leasing method. The advantages attached to machine ownership would give preference to the ownership method when the costs are this close.

Machine ownership under the 900 acre model was most efficient. The costs per acre were \$13.78 for machine ownership, \$14.21 for custom work and \$18.98 for the leasing method. This advantage of ownership can be attributed to more intensive use of equipment.

Leasing at the established rates is not an efficient method of doing machine work on the 300, 600 or 900 acre model farms.

Before custom work can be considered comparable, the service must be available when needed and the operator must be dependable and efficient. Under these conditions, units of 300 acres of crop land or less should always use custom work.

Fixed costs are a major portion of total machinery costs. Thus, per-acre costs of machinery, in many cases, can be reduced by maximizing the use of equipment.

## RECOMMENDATION

1. Dry farmers with small units should keep records of their machine costs to determine whether or not they can afford to own their own equipment. They should use the formula:

$$\begin{array}{r} \text{Annual use units} \\ \text{to justify ownership} \end{array} = \frac{\text{annual fixed costs}}{\text{custom rate per unit}} - \text{minus variable cost per unit}$$

2. The Agricultural Experiment Station and the Extension Services throughout Utah should increase their efforts to assist the dry farmers reduce their operational costs. This could be done if more funds were devoted to machinery cost reduction research and more educational programs were developed to show dry farmers how to increase the utilization of their farm machinery.

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