1-1994

Farm Machinery Costs: Own Lease or Custom Hire

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EC 899
January 1994

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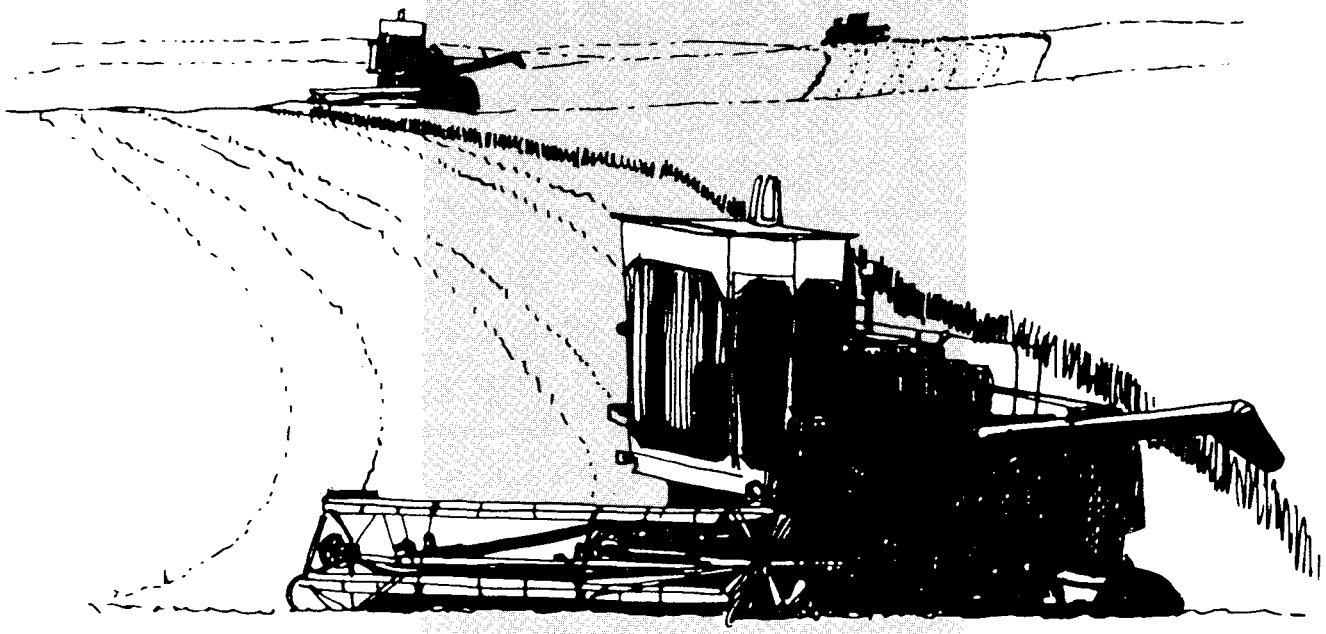

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Farm Machinery Costs

Own, Lease, or Custom Hire

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One of the largest annual costs on South Dakota farms and ranches today is that of owning and operating machinery. Total costs associated with farm machinery have increased as farm operators have expanded their operations and substituted machines for labor. This trend does not appear to have run its course because new and larger machines are continuously being developed and adopted.

Along with these changes have been corresponding increases in productivity per worker, average farm size, and total machinery investment. In many cases, increased investment in machinery has occurred at the expense of operating capital. Farmers have had to invest heavily in modern machinery without being able to expand production enough to justify the added investment. To add to the problem, rising production costs, variable farm prices, and the increasingly competitive nature of all agricultural production have combined to exert important economic pressures on farmers.

These trends are causing farmers to take a closer look at the alternatives to machine ownership in order to release scarce capital for investment in other phases of the farm business where a higher return can be realized.

Contents

This publication updates and replaces EMC 664.

Special thanks to G.R. (Bob) Durland, Extension agricultural engineer, for assistance in drafting and revising.

Owning Farm Machinery

The management implications at the time a farmer purchases a machine are especially important because the day the machine is purchased, he obligates himself to much of the total cost of owning it. Depreciation, interest, repairs, taxes, insurance, and housing represent ownership costs -- costs that are relatively unaffected by the amount of annual use. Stated in another way, a farmer incurs these ownership costs to a large extent even if the machine is allowed to remain idle. Repair costs might be the one exception because they exhibit both ownership and operating cost characteristics. Delays in making needed repairs often result in excessive wear and, therefore, increased depreciation. Repair costs also increase with annual use resulting in increased operating costs. It is generally agreed, however, that the repair costs should be classified along with other fixed ownership costs and expressed as a percentage of original machine cost.

Depreciation

Depreciation costs depend on the useful life of a given farm implement. They also are defined as the loss in value resulting from natural wear in use, obsolescence, accidental damage, rust, corrosion, and weathering. Depreciation is an allowance set aside for replacing the machine at the end of its useful life. There generally are two alternatives in computing depreciation -- a rate that truly reflects the machine's annual use or wear-out rate and a rate that will be most beneficial in the form of income tax deductions. Once the expected service life of a machine has been determined, there are several methods of estimating depreciation. Most farmers use one of the following:

- Straight-line.
- ACRS (Accelerated Cost Recovery System).
- MACRS (Modified Accelerated Cost Recovery System).

The straight-line method provides for distributing the cost of a machine, less its salvage value, over a period of years representing its estimated useful life. If a farmer is expanding his business or expects higher income in future years, he may prefer this method on newly purchased machines in order to have more depreciation deductions in future years. On the other hand, faster depreciation using the ACRS or MACRS methods may be to the advantage of the farmer who expects to retire before the useful life of a machine is expended. These methods might also be helpful to young farmers in keeping their tax bill lower and leaving more cash available for debt retirement and business expansion. There is also an expensing out that may be used in computing income tax the first year the machine is purchased. There is no one best method that can be applied to all situations; each has certain advantages. The best method for each farmer depends upon his financial position.

Additional information concerning depreciation allowances and provisions may be found in North Central Regional Publication No. 2 "Income Tax Management for Farmers" and the annual "Farmers Tax Guide" published by the Internal Revenue Service. Both are available through county Extension offices.

Interest on Investment

Interest on investment in a farm machine is one of the costs of ownership because money used to buy the machine cannot be used for other enterprises or other purposes apart from the farm business. This is true even though the farmer does not borrow money to buy the machine. The investment has been written off as depreciation; therefore, over the life of the machine the average amount invested is about one-half the initial cost. Annual interest on machinery can be calculated by multiplying the current interest rate times one-half the original value or by using the reverse procedure of multiplying one-half the current interest rate times the original cost of the machine.

Repairs

Repair costs are difficult to estimate because the amount of use, nature of use, and the maintenance and care given the machine influence repair needs. Repair costs usually include both the material and labor required to make the repairs. Normally, repair costs are expressed as a certain percent of the new cost of the machine. This method can be justified only when the machine is maintained for its entire service life because repair costs

Table 1. Suggested value to use in calculating annual repair costs for various farm machines.

Machine	Recommended speed mi/hr.	Field Efficiency %	Lifetime repair cost as a % of cost of machine	Expected life of machine in hours
Baler, hay, PTO - - - - - -	3.5	75	80	2000
Blower, forage, PTO - - - --	-	-	50	2000
Combine, Pull Type, PTO - -	3	65	60	2000
Combine, self-propelled - -	3	70	35	2000
Cultivator, field - - - - -	5.5	85	80	2000
Cultivator, Row Crop - - -	3.5	80	100	2000
Drill, grain - - - - - - -	4	70	80	1200
Fertilizer spreader - - - -	4.5	70	120	1200
Field forage harvester, PTO	2.5	65	80	2000
Field forage harvester, self-propelled	3	70	80	2000
Grinder, feed, hammer mill	(not available)			
Harrow, tandem disk - - - -	4	80	60	2000
Harrow, spring tooth - - -	5	85	80	2000
Hay stacking machine, mobile, PTO	3.5	60	80	2000
Mower Conditioner - - - - -	4.5	75	80	2000
Mower, sickle - - - - - - -	5	80	150	2000
No-till Seeder - - - - - -	5.3	65	80	1200
Picker, sheller, corn - - -	2.5	65	70	2000
Planter, row crop, conventional	4.5	60	80	1200
Plow, chisel - - - - - - -	4.5	85	80	2000
Plow, moldboard - - - - - -	4.5	80	150	2000
Rake, side-delivery - - - -	4.5	80	100	2000
Rotary hoe - - - - - - - -	7	80	60	2000
Sprayer, trailer-boom - - -	6.5	65	70	1500
Spreader, manure - - - - -	(not available)			
Tractor, 2 or 4 wheel drive	-	-	100	10000
Trailer (wagon) - - - - - -	-	-	80	3000
Windrower, self-propelled -	(same as mower-conditioner)			

Source: ASAE Standard (1990)

Table 2. Summary of annual ownership costs for a $90,000 self-propelled combine.

Item		Amount	Annual ownership costs % of new cost
Depreciation	$\frac{\$90,000 - \$9,000}{10}$	$8100.00	9.00
Interest	$\frac{\$90,000 \times 8\%}{2}$	$3600.00	4.00
Taxes	90,000 x 0.30%	270.00	.30
Insurance	90,000 x 0.20%	180.00	.20
Housing	90,000 x 2.30%	2070.00	2.30
Repairs	90,000 x 3.50%	3150.00	3.50
Total annual ownership cost		$17,370.00	19.3

increase with use. In Table 1, repair costs vary from 35 to 150% depending upon the type of implement and the amount of maintenance required. If the rate for a particular machine is not listed, use the rate for a similar machine. Annual repair percent can be estimated by dividing annual use in hours by the lifetime hours and multiple by the machine's lifetime repair percentage. Table 2 illustrates the use of repair cost. In the case of a $90,000 combine, the repair costs would be [($90,000 x .35) x (200/2000) = $3150].

Insurance

A survey of insurance companies that provide statewide coverage in South Dakota indicates the average rate is about $.40 per $100 valuation. This charge protects against fire, theft, wind, hail, vandalism, and overturn. It does not include liability protection. This is often carried under a separate policy or included in broad insurance coverage with farm buildings.

The annual charge for insurance at the $.40 rate would be approximately 0.20% of the original machine cost. For example, a charge of $180.00 would be made on a $90,000 machine (average life span value of $45,000).

Taxes

Use the local mill levy, if available, when calculating tax obligations because levies vary considerably among school districts and communities.

A 3% sales tax on a $90,000 machine when spread over the 10 year life of the machine would be $270 per year or 0.3% of the initial cost each year.

Housing

The economic value of shelter for farm machinery has been debated for many years. A North Dakota study shows that after five years, tractors left outside have a 16.4% lower trade-in value than tractors kept under cover. Harvest equipment 20.3% if a charge of housing is not made, a higher depreciation rate should be used. A suggestion of 2.3% of new machine cost is used in Table 2 as a reasonable estimate for annual housing costs.

Table 2 provides a summary of annual ownership costs for a $90,000 self-propelled combine with an estimated useful life of 10 years and a salvage value of 10% of new cost.

Leasing Farm Machinery

A high machinery investment often exists at the expense of operating capital, and many farmers are coming to realize that leasing farm machinery can be useful in obtaining more working capital in agriculture. Scarce capital that is made available by leasing a machine rather than owning it can logically be invested in other farm enterprises where the return is higher.

Leasing arrangements are offered in a wide variety of plans depending on the terms of the lease, value of the machinery, the extent of the machine use, and services supplied. The three types of leasing agreements generally offered in South Dakota include:

- Short-term lease.
- Long-term lease.
- Full-service lease.

Short-Term Lease (generally less than one year)

This type of lease allows a farmer to acquire the use of a particular machine on a short-term basis. Rates may be charged by the hour, day, week, month, or season. Agreements may be either written or oral. Obviously, disagreements are more often encountered in the absence of a written lease. Short-term contracts should cover the following points:

- Rental rates.
- Responsibility for loss or damage of equipment.
- Responsibilities of lessor and lessee.
- Operating expenses and repairs.
- Sub-lease agreements.
- Normal wear and tear.
- Provisions for contract cancellation.
- Insurance.
- Provisions for time lost due to mechanical failure and adverse weather.
- Pick up and delivery of machinery.

Long-Term Lease

Provisions of this type of lease are similar to those for purchase under a sales contract. In most cases, the actual leasing of equipment is done by a leasing company in cooperation with a local dealer. Lease payments are made in advance on a monthly, quarterly, or annual basis. The lease payments, in total, will normally exceed the purchase price of the machine.

The long-term lease may contain an "option to buy" the machine during the contract period or when the lease expires. It may also contain a renewal or extension option which will allow the lessee to renew or extend the lease on terms not to exceed the original terms. It may, however, provide more favorable terms than the original lease.

Terms of this lease usually stipulate that the lessee is responsible for all costs, expenses, fees, charges, and taxes incurred in connection with the use and operation of the machine. The warranty may be transferred to the lessee under the terms of the contract.

Carefully check the income tax implications of this type of lease with the Internal Revenue Service or a tax consultant before signing. If the transaction is really a lease, the payments are deductible. But if it is a method of acquiring the machine, the transaction is considered a sale and the farmer may deduct depreciation and interest but not the payments.

Full-Service Lease

The full-service lease is rapidly becoming the preferred lease with farmers, especially for those who are in the practice of leasing tractors. Under the terms of this lease, the leasing company provides everything except the fuel and the operator. Insurance, taxes, repairs, and maintenance on a periodic basis are the responsibility of the company. The usual provisions concerning normal wear and tear, sub-leasing, and other lessee responsibilities and privileges also are contained in this type of agreement and are similar to those of the short-term and long-term lease.

Leasing Rates

The amount that actually is paid for the use of a machine becomes the annual, fixed cost of leasing whether the lease period is 1 day or 1 year. Rates generally are stated as a percentage of the initial cost of the machine and are based on the length of the lease agreement. The possible leasing rates for several different periods of times are given in Table 3. Rates for short-use, seasonal equipment may be higher so that dealers can cover their costs and still show a profit. For this reason, there are three suggested rates for the 1-year period. It should be recognized that rates must be established high enough to allow the dealer to provide the leasing service, otherwise he will be forced to discontinue it. It also is up to the farmer to decide if he can afford the dealer's terms. In other words, there are unavoidable costs that must be taken into consideration on both sides.

Tractors commonly rent for around 12 cents per horsepower hour, depending on service. One dealer leased used tractors for the following rates:

10 cents/Hph for 2-wheel drive	minimum of 50 hours
15 cents /Hph for front -wheel assist	per 14 day period
20 cents/Hph for 4-wheel drive	furnish oil and filter

Table 3. Leasing periods and probable rates.

Leasing period	Leasing rate of machine (% of new cost)
1 day (10 hours)	1
1 week (6 days)	5
2 weeks (12 days)	10
1 month (4 weeks)	15
2 months (8 weeks)	25
3 months (12 weeks)	33
1 year	10, 20, 30

Machine Field Capacity

Before a comparison of lease, ownership, and custom hire costs can be made it is necessary to know something about the capacity of the machine.

The field capacity of any machine is the actual number of acres that can be covered in a given period. It usually is expressed in acres per hour and is somewhat less than the full potential capacity of the machine. Time lost due to repairs, adjustments, filling fertilizer and seed hoppers, clogging the machine, turning, idling, and unloading at the end of the field all determine the effective capacity of the machine.

Some general estimates of typical field efficiency percentages are given in Table 1, Column 2.

Speed of travel and width of cut also determine the number of acres that can be covered per hour of running time. Width of cut is the actual width of the area covered by the machine. In the case of balers and combines, this depends on the width of the machine that precedes the baling or combining operation. Speed of travel in miles per hour is easily determined by consulting the operator's manual or by direct observation.

The number of acres that can be covered in 1 hour with any field machine can be calculated from the following formula:

$$\frac{\text{Machine Width (ft.)} \times \text{Speed (MPH)} \times \text{Field Efficiency}}{8.25} = \text{Acres/Hour}$$

For example, a 24-foot self-propelled combine operating at a speed of 3.1 miles per hour with a field efficiency of 70% will cover approximately 6.3 acres per hour:

$$\frac{24 \text{ feet} \times 3.1 \text{ MPH} \times .70}{8.25} = 6.3 \text{ Acres Per Hour}$$

(1 Acre = 1 rod x 1/2 mile or 8.25 feet x 1 mile)

Estimating Operating Costs

Cost of operating a machine (fuel, oil, grease, and operator labor) normally is included in a custom hire operation so it also must be considered as a cost of owning or leasing a machine if a meaningful comparison is to be made.

Fuel and Lubricants

Extensive research has been done to determine machine operation costs. Multipliers for fuel and lubricant cost calculation have been developed in relation to type of fuel and size (horsepower) of engine-driven implements. Table 4 provides fuel use in gallons per hour per horsepower hour. Each multiplier allows a 15% increase in fuel costs to cover the cost of lubricants and filters. Keep in mind that these are only estimates and if more accurate information is available, use it.

Using the information in Table 4, the fuel and lubricant costs per hour can be determined by using the following formula:

Fuel Cost Multiplier x Horse Power x Price Per Gallon = Fuel and Lubricant Cost Per Hour

Fuel and lubricant costs for a 162 horsepower self-propelled combine would be calculated as follows:

.075 x 162 x $1.1200 = $13.61 per hour

Fuel price (diesel) is defined as the actual cost per gallon after tax refund; therefore, assuming a price of $1.22 per gallon delivered to the farm minus $.10 per gallon state and federal tax refund, the actual price is $1.12 per gallon.

If the machinery normally can cover 6.3 acres per hour, the fuel and lubricant cost per acre would be approximately $2.16 ($13.61 / 6.3).

Labor

A labor charge of $6.00 per hour will result in an additional cost of $0.95 per acre if machine capacity is again assumed to be 6.3 acres per hour ($6.00 / 6.3).

Total operating costs amount to $3.11 per acre ($.95 + $2.16).

Table 4. Estimated fuel and lubricant use in gallons per horsepower hour.

Equipment	Diesel
Tractors (2 wheel drive)	.075
Self-propelled combine	.075
Self-propelled swathers	.075
Trucks and pickups	
4-wheel drive tractors	.066
Self-propelled forage harvesters	.066
Crawler tractors	.06
Lubrication cost = 0.15 times fuel cost	

Source: Nebraska Tractor Tests

Cost Comparison of Leasing, Owning, or Custom Hiring

PROBLEM: Should I buy, lease or custom hire a $90,000 self-propelled combine?

ASSUMPTIONS: Potential annual use --1191 acres.

Average work day -- 9 hours at 6.3 acres per hour or approximately 56.7 acres per day.

Total running time --21 days under ideal combining conditions.

No allowance for time lost to bad weather or breakdowns.

Annual ownership costs (depreciation, interest on investment, taxes, insurance, housing, repairs) from Table 2 amount to 19.3% of the purchase price or $17,370. Operating costs include $2572.56 for fuel and lubricants (1191 acres x $2.16) and $1131.45 for operator labor (1191 acres x $0.95).

Assuming lease rates in Table 3 are in effect, the machine can be leased at a rate of 5% per week (6 days) or 15% for 1 month (4 weeks). The lessee would undoubtedly select the monthly rate because this would provide a cushion for time lost due to adverse weather.

Custom rate for combining small grain is $15.00 per acre.

The cost comparisons in Table 5 indicate that, under the assumptions used, owning the machine would be the most costly method of getting the job done. Custom hire would be the intermediate cost method, and leasing would afford the lowest cost.

Break-Even Point

The annual fixed cost of ownership is assumed to be constant for the season or the year; therefore, these costs become the key to calculating the break-even point or the number of acres where the two alternatives are equal in cost. The following formula may be used for this purpose:

$$\text{Break-even Acreage} = \frac{\text{Annual Ownership Costs}}{\text{Custom Rate Per Acre - Operating Costs of Owned Machine Per Acre}}$$

Table 5. Estimated costs of leasing, owning, and custom hiring a $90,000 self-propelled combine, 1191 acres.

	Ownership	Lease	Custom Hire
Lease cost		$13,500.00	
Ownership cost	$17,370.00		
Custom hire cost			$17,865.00
Operating costs			
Fuel and lubrication	2,572.56	2,572.56	
Operator labor	1,131.45	1,131.45	
Total costs	**$21,074.01**	**$17,204.01**	**$17,865.00**

Break-even point, for example, in Table 5 is 1461 acres.

$$\text{Break-even Acreage} = \frac{\$17.370}{\$15.00 - \$3.11} = 1461 \text{ Acres}$$

The break-even point between leasing at the 15% rate and custom hire may be calculated by substituting lease costs for ownership costs in the formula.

$$\text{Break-even Acreage} = \frac{\$13,500}{\$15.00 - \$3.11} = 1135 \text{ Acres}$$

In other words, if a farmer has more than 1461 acres, theoretically, it would be cheaper for him to own the machine than hire the work done by a custom operator. In the case of leasing versus custom hire, he would profitably lease the machine rather than hire a custom operator, if he could combine at least 1135 acres during a 1-month leasing period.

These same relationships between acres of annual use and total annual costs are shown graphically in Figure 1. The lease curve is based on probable rates and periods shown in Table 3 and daily operating costs which are calculated in the following way:

$$\$3.11 \text{ Per A} \times 56.7 \text{ A Per Day} = \$176.34 \text{ Operating Costs Per Work Day}$$

A further assumption is made that only 5 working days will be realized for every 7 calendar days. Stated in another way, the combine will be idle 2 days each week to allow for Sundays, holidays, or adverse weather. This will necessarily lengthen the lease period and increase the total cost of leasing.

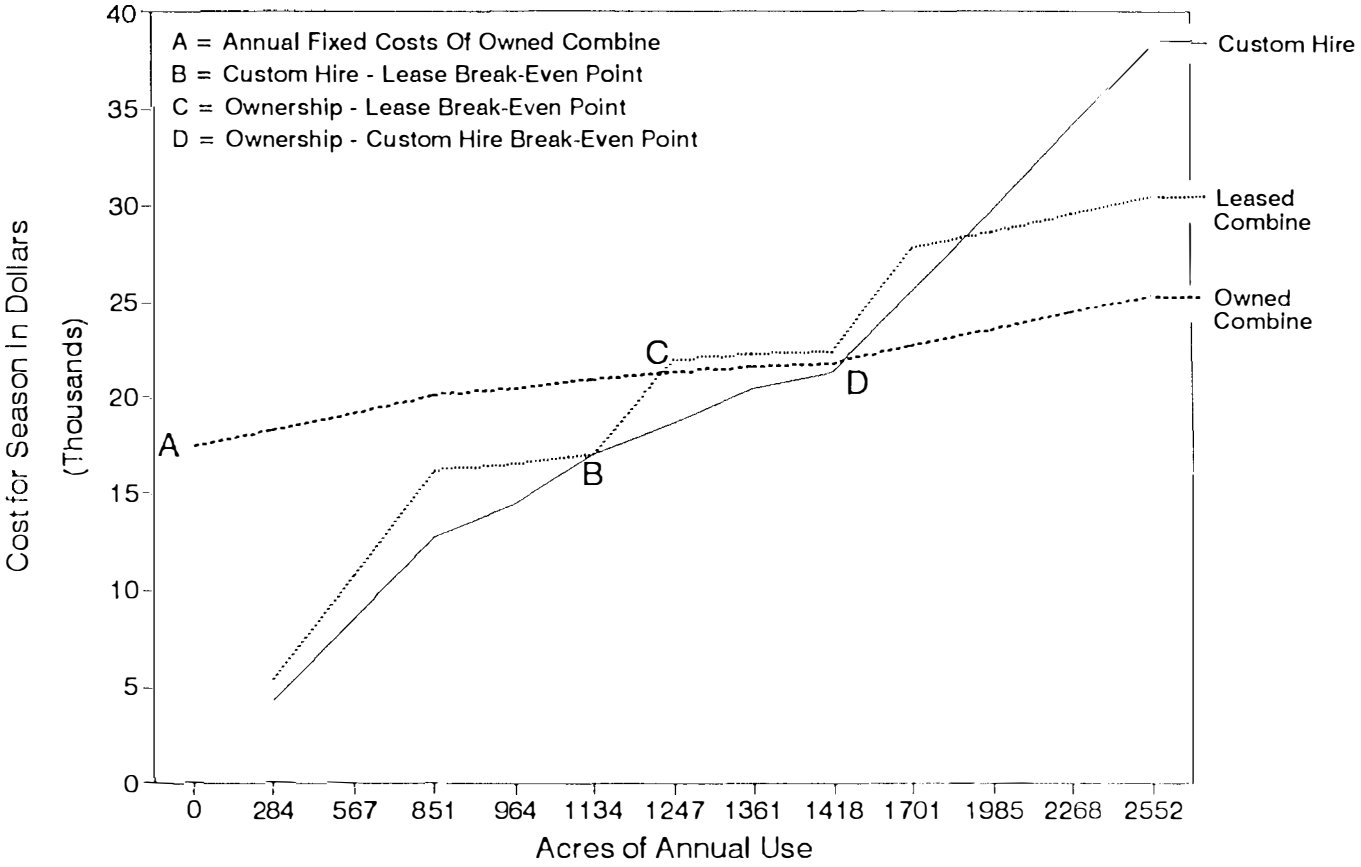
Table 6 provides more complete information in regard to the acres, days, and costs involved in locating the eight different points on the lease curve. Each of the points shows the relationship that exists between acres and lease costs.

Table 6. Lease costs according to acres of annual use.

\$90,000 = Cost of Purchased Machine; \$2.16 = Fuel, Oil & Grease; \$6.00 = Labor per Hour
6.3 = Capacity in Acres per Hour; 9 = Machine Tach Hours of use per Day; 19.3% = Ownership Costs in % of New Cost

Acres	Work days	Lease period (days)	Lease costs (%)	Lease costs (dollars)	Total operating costs	Leased Combine costs	Custom Hire costs	Owned Combine costs
0								\$17,370
284	5	7	5	\$ 4,500	\$ 882	\$ 5,382	\$ 4,253	18,252
567	10	14	10	9,000	1,765	10,765	8,505	19,135
851	15	21	15	13,500	2,647	16,147	12,758	20,017
964	17	23	15	13,500	3,000	16,500	14,459	20,370
1134	20	28	15	13,500	3,529	17,029	17,010	20,899
1247	22	30	20	18,000	3,882	21,882	18,711	21,252
1361	24	33	20	18,000	4,235	22,235	20,412	21,605
1418	25	35	20	18,000	4,412	22,412	21,263	21,782
1701	30	42	25	22,500	5,294	27,794	25,515	22,664
1985	35	49	25	22,500	6,177	28,677	29,768	23,547
2268	40	56	25	22,500	7,059	29,559	34,020	24,429
2552	45	63	25	22,500	7,941	30,441	38,273	25,311

Figure 1. Break-even acreage and annual costs in relation to annual use for a $90,000 self-propelled combine.



Keep in mind that the relationships shown in Figure 1 for lease, ownership, and custom hire costs represent certain assumptions that may not be realistic for all areas of the state. Operating costs and the number of acres covered per hour will vary. Custom charges and leasing rates will differ from one area of the state to another. The amount of annual use may vary.

However, the procedure can be used as a guide for determining the costs of the three alternatives for other machines and different situations.

Additional Considerations

Other factors, mostly intangible, must be evaluated when considering the alternatives to machine ownership.

Timeliness of Operation -- Will the machine be available when needed? Delays at critical times, such as planting or harvesting, can result in greater losses than any savings that might result through leasing or custom hire.

Quality of Custom Work -- Custom operators must do good work in order to stay in business; however, during a rush season, an occasional operator may do unsatisfactory work resulting in lower yields and product quality.

Pride of Ownership -- A certain pride of owning a particular machine will usually result in better care and maintenance and, over a period of years, will be reflected in lower operating costs. Social prestige gained by owning a certain machine also can be important.

Availability of Labor -- If labor is not available to operate a leased or owned machine, it will have to be hired. This would create an added expense in either case. A reasonable alternative might be to hire custom operators where both machines and labor are included in the custom rate.

Investment Credit -- This is not available at the present time, but it might be in the future. Always investigate the investment credit implications of a machine purchase, because it involves a deduction from the total tax bill, not just from taxable income. In some cases, this tax deduction could reduce the cost of equipment enough to make ownership profitable

Flexibility -- Present day farm operations demand a certain amount of flexibility -- the ability to meet changing conditions. Leasing or custom hire often frees scarce capital and enables farmers to take advantage of other alternatives.

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1,000 copies printed and distributed by CES at a cost of $1.02 each. ES595 February 1994.