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FARM EQUIPMENT LEASING ECONOMICS



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CONTENTS

Introduction.....	1
What is Leasing.....	1
Who Offers Leases to Farmers.....	1
What Can Farmers Lease.....	2
Myths and Reality.....	2
The Lease Analysis.....	3
Cost Analyses.....	3
The Lease Break-Even.....	4
Impact of Recent Tax Changes.....	4
Lessor vs. Lessee Income Tax Treatment.....	9
Factors Affecting Ownership Costs.....	13
The Finance Option.....	13
Tax and Interest Rates.....	14
Residual Value and Discount Rate.....	18
Computer Routines.....	18
Other Consideration.....	21
Market Risks.....	21
Personal Preferences.....	22
Flexibility.....	22
Summary and Conclusions.....	23
Literature Cited.....	25

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FARM EQUIPMENT LEASING ECONOMICS

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INTRODUCTION

Recent tax legislation, cash flow problems, and increasing financial sophistication among farm and ranch managers have combined to generate an unprecedented interest in lease financing in agriculture. Equipment leasing has long been commonplace in major non-agricultural industries. Farmers and Ranchers have traditionally leased land but, until recently, lease financing of depreciable assets has rarely been used in agriculture.

What is Leasing?

Financial leasing should not be confused with short term renting. It is frequently convenient to rent a tractor, or other machinery or equipment, for a short period such as an hour or a day. However rental agreements involve no long term commitment on the part of either party to the agreement. Leasing refers to a relatively long term arrangement that gives the lessee exclusive use of the leased property over the period of the lease. Thus a lease is an option for acquiring the long term control of property. It should be compared to purchasing either with cash or through the use of conventional debt finance.

Leases may be written for various periods of time. As a practical matter, most agricultural leases are written for the period corresponding to the ACRS (Accelerated Cost Recovery System) life of the equipment, or in most cases involving agricultural assets, five years. Such a period permits the utilization of the full allowable investment tax credits (ITC) as well as allowable ACRS depreciation benefits associated with the investment. Tax credits and benefits can, by mutual agreement, be utilized by either party to the lease. However in the vast majority of cases, it is more advantageous for the lessor to receive the various credits and benefits, and to reflect the credits and benefits in a reduced lease rate.

Who Offers Leases to Farmers?

A diverse and large number of companies offer leasing services to farmers and to other businesses. Leasing is the only business of some companies. Other firms offer leasing along with other financial services. Still other companies offer leasing as well as

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a great variety of unrelated services and products. Leasing companies that offer leases only on products manufactured by their parent company, are often referred to as "captive" leasing companies. Thus leasing companies that lease products produced by a variety of manufacturers may be referred to as "independent" lessors. Some leasing companies are locally owned and managed while others are a part of national or regional firms.

Examples of firms offering leases on agricultural machinery, equipment, and livestock include commercial banks, equipment manufacturers and dealers, production credit associations, and various firms established specifically to offer leasing services. The services and terms offered by the various lessors tend to be similar in the case of equipment leases. However the market for livestock leases appears to be less well developed and standardized, thus provisions and terms of livestock leases tend to differ significantly among lessors.

What Can Farmers Lease?

No recent statistics are available to indicate the total volume of agricultural leasing nor the classes of assets most frequently leased. However, machinery and equipment are the items most often leased. Nevertheless trade reports indicate a large volume of leasing in grain storage bins, and livestock leasing is important, particularly in the northeastern dairy industry. Although agricultural leasing on a volume basis is relatively new, leasing is being accepted as a means of financing virtually all classes of depreciable agricultural assets.

Myths and Reality

Certain alleged advantages of leasing do not appear to be relevant in the current decision environment. For example it has often been claimed that leasing avoids the risk of obsolescence of equipment. In some past cases this may have been true, but lessors are aware of this risk. Thus lease terms are structured to reflect the risk of the obsolescence.

Another myth is that leasing is not reflected in the balance sheet or financial statement, of the individual or the business, therefore leasing does not impair nor affect borrowing limits. It must be clearly recognized that a lease contract is a binding agreement and lease payments constitute a continuing legal obligation over the lease period. Lenders are, of course, aware of this fact and take it into account in considering loans. Further, it is usual practice to note lease obligations in financial statements. In short, it is doubtful that equipment and livestock leasing increase the total capital that one can control. In some cases a stronger financial statement may be required for leasing than for purchasing.

Leases sometimes include services not provided when the item is purchased. For example, some lessors provide certain types of insurance on leased property. Such items should of course, be taken into account in making the lease vs purchase cost comparison. In other cases the lessor may provide maintenance for the equipment. However maintenance is seldom offered as a part of leases on agricultural equipment or livestock. If maintenance is offered, it should be reflected in making cost comparisons.

THE LEASE ANALYSIS

As suggested earlier, it is wise to think of leasing as an alternative to an equity or debt financed purchase. Consequently, the cost of acquiring and using property under a lease agreement as compared to a purchase, is a major decision criteria. More accurately, the present or discounted value of ownership costs should be compared to the present value of the cost of leasing. However, there are factors other than the present value of costs of ownership vs leasing that should be considered. For example, cash flow requirements may be different for leasing as compared to purchasing. This factor can be significant in some cases. If, for example, cash flow requirements are higher in the early years for one option as compared to another, the lower "up front" requirements of the one option will tend to favor that option.

Cost Analyses

A careful cost analysis is indicated when investments are under consideration. The present value of ownership costs, in the case of cash purchase, is the purchase price less the discounted value of tax benefits. However most often, debt finance is used to purchase capital assets. Thus the timing of the payments must be considered.

In the example which follows, a debt financed purchase is assumed. More specifically, a finance plan involving a 25 percent down payment, due on delivery, and five equal annual payments is assumed. The first annual payment is assumed to be due one year after the down payment, with other payments becoming due at annual intervals. A 15 percent annual rate of interest is assumed. The analysis is based on a \$1,000 item to facilitate the interpretation of the results for equipment at various cost levels.

The first step in determining ownership costs is to determine the costs of the finance plan under consideration. Finance cash flow, given the 25 percent down payment followed by five equal annual payments, is detailed in Table 1. The annual payments for the \$1,000 purchase are \$223.74. The total interest payment over the five-year period is \$368.68. Depreciation, using the ACRS rules for a five-year item is also given in Table 1, and totals \$950.00 over the five-year period. This is because, under current tax rules, only 95 percent of the new cost of a five-year ACRS item is depreciable if the full 10 percent investment tax credit is claimed.

In estimating the tax benefit or adjustment (saving attributable to the purchase of the \$1,000 asset), "farmer tax rules" are assumed. The basis of this assumption will be examined at a later point. However, in essence, tax benefits are assumed to be realized in the year following the event generating the benefit. That is, tax benefits are assumed to be lagged one year. Using the example case, during the first year the 10 percent ITC credit of \$100.00 would be earned, plus the interest paid and depreciation multiplied by the example tax rate of 20 percent, for a total of \$128.50. Yet since farmers may not pay taxes during the year based on estimated income, the tax benefit is assumed to be realized when the tax return is filed and taxes paid early in the next year.

It is assumed that the item is sold at its residual value, 25 percent of new cost in the example case, when the fifth payment is made at the beginning of the sixth year. Thus the tax adjustment in the last year includes depreciation recapture, based on the sale (residual value) price multiplied by the tax rate. Note that the total tax benefit (savings) attributable to the asset purchase is \$313.74.

Total Cash Flow (costs) associated with the \$1,000.00 purchase consists of the down payment and the annual payments, less the assumed salvage value of \$250.00, for a total \$1,118.68 as shown in Table 1. Net Cash Flow is cash flow less Tax Benefits and totals \$804.95 in the example case. Net Cash Flow is, of course, the after tax cash flow of costs. It should be noted that, as used here, a positive number is a cash outflow and a negative number is an inflow or income item.

It is well known that money has time value. That is, an expense incurred in the current period is more costly in present value terms than an expense of the same amount incurred in a later period. The discount rate is the measure of the relative value of expenses or income paid or received in different time periods. For example using a 10 percent discount rate, a dollar received in one year into the future has a value 10 percent less than one dollar received today. Using a 10 percent discount rate, the after tax cash flow is (net cash flow) discounted to the present time period. The value (cost) in present terms (present value) of the \$1,000.00 asset for a five-year period is equivalent to a current cost of \$684.23.

The Lease Break-Even

Given the estimated present value of the cost of the purchase of \$684.23, the annual lease rate for a five-year period that would result in the same present value of costs as owning the equipment can be calculated. For the example case, the Break-Even Lease is \$200.55. Thus if the decision maker is offered an annual lease rate over a five-year period of less than \$200.55 per year, other things being equal, it would be less expensive to lease than to own the asset. The details of computing the break-even lease rate will be discussed at a later point. Suffice it to say at this point that the calculation can be made with a simple calculator, but it is very easy using an available microcomputer program.

The computed break-even lease rate can be verified, as shown in Table 1 in the Break-Even Lease Analysis section. The cash flow is the lease rate, tax benefits are the lease rate times the tax rate, and net cash flow is the after tax cash flow. The present value is again computed by discounting the net cash flow. The sum of the annual present values is \$684.23 showing that from a present value of cost viewpoint, one would be indifferent between owning the asset or leasing it at a rate of \$200.55.

Impact of Recent Tax Changes

The Economic Recovery and Tax Reform Act of 1981 (1981 Act) and the Tax Equity and Fiscal Responsibility Act of 1982 (1982 Act) significantly changed the agricultural leasing environment. Prior to the 1981 Act, a lease was required to meet various stringent requirements in order to qualify as a true lease for tax purposes. For example, the lessor was required to maintain an "at risk"

Table 1. Calculation of Ownership Costs and Lease Break-Even Rate, \$1,000 Asset,
15 Percent Interest, 10 Percent Discount Rate, 25 Percent Residual
Value, Farmer Tax Rules, 25 Percent Down Five Year Finance Plan

ITEM	YEAR							TOTAL
	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	
<u>Finance Plan-Down Payment and Five Equal Annual Payments</u>								
Payment	\$250.00	\$223.74	\$223.74	\$223.74	\$223.74	\$223.74		\$1368.68
Interest	0.00	112.50	95.81	76.63	54.56	29.18		368.68
Principle	250.00	111.24	127.92	147.11	169.18	194.55		1000.00
<u>ACRS Depreciation Schedule-Five Year Item</u>								
Depreciation	\$142.50	\$209.00	\$199.50	\$199.50	\$199.50			\$950.00
<u>Tax Benefits</u>								
Tax Benefits	\$ 0	\$128.50	\$64.50	\$59.06	\$55.23	\$50.81	\$-44.16	\$313.74
<u>Ownership Costs</u>								
Cash Flow	\$250.00	\$223.74	\$223.74	\$223.74	\$223.74	\$-26.26		\$1118.68
Net Cash Flow	250.00	95.24	159.44	164.67	168.51	-77.08	\$44.16	804.95
Present Value	250.00	86.58	131.77	123.72	115.10	-47.86	24.93	684.23
<u>Break-Even Lease Analysis</u>								
Cash Flow	\$200.55	\$200.55	\$200.55	\$200.55	\$200.55			\$1002.77
Tax Benefits	0.00	40.11	40.11	40.11	40.11	40.11		200.55
Net Cash Flow	200.55	160.44	160.44	160.44	160.44	-40.11		802.22
Present Value	200.55	145.86	132.60	120.54	109.59	-24.91		684.23

investment in the property equal to no less than 20 percent of the purchase price, and the remaining useful life of the item at the end of the lease period was required to be at least 20 percent of the original estimated useful life. This in effect required a minimum 20 percent residual value of the equipment and limited the lease period.

One particularly restrictive provision, to qualify as a true lease for tax purposes, was the prohibition of including a purchase option or an option to renew the lease, at other than "fair market value", with the value to be determined at the end of the lease period. This prohibition made it difficult for both lessors and lessees to calculate the cost of providing the lease and the cost of acquiring the services of the capital under a leasing agreement.

The Act of 1981, in effect, removed the "at risk" requirement as well as the requirement that 20 percent of the estimated useful life of the asset remain at the end of the lease period. The 1981 Act also permitted lessors to offer fixed price purchase options. These provisions reduced lessee uncertainty and in general made leasing a more attractive option for acquiring the use of depreciable assets.

Prior to the 1981 Act, there had been a concern that IRS may, after the fact, classify an agreement as a conditional sales contract rather than as a lease. This would in effect preclude the lessor from claiming investment tax credits as well as depreciation and interest deductions, and prohibit the lessee from writing off, for tax purposes, the annual lease payments. A major feature of the 1981 Act was a safe harbor provision which clarified the definition of a true lease for tax purposes. This provision removed the concern on the part of lessors and lessees as to the tax treatment of leases.

In order to qualify as a safe harbor lease for tax purposes the 1981 Act provided five criteria as follows:

1. The lessor must be a regular corporation (not sub-chapter "S", commonly referred to as a Small or Family Corporation).
2. The lessor and lessee must elect to treat the lessor as the owner of the property.
3. The property must be new depreciable personal property leased within three months of acquisition.
4. The lessor must maintain a minimum at risk investment up to 10 percent of the value of the property, and
5. The term of the lease must not exceed the greater of 90 percent of the useful life of the property or 150 percent of the mid-class life under the old asset depreciation range system.

The 1982 Act eliminated most of the safe harbor provisions of the 1981 Act but, in effect, the safe harbor provision was maintained in the case of agricultural leases up to a maximum of \$150,000 per year per farm operation. The special agricultural lease provisions of the 1982 Act are designated as the farm finance lease.

Effective January 1, 1984, as provided in the 1982 Act, finance leases will be available to both farmers and non-farmers. To qualify as a finance lease the following conditions must be met:

1. A lessor must be a corporation other than a subchapter "S" corporation or a personal holding company, a partnership

- comprised of corporate partners, or a grantor trust where the grantor and the beneficiaries are corporations.
2. Eligible property must be new recovery property leased within three months after being placed in service.
 3. Investment tax credit must be spread evenly over five years. Regular ACRS recovery periods apply.
 4. A lessor, through finance leasing, cannot reduce its income tax liability by more than 50 percent in any one taxable year.
 5. A lessor is prohibited from using the tax benefits of finance leasing to generate a net operating loss or ITC carryback to a previous taxable year.
 6. A 40 percent limitation is placed on the amount of property a lessee can lease under a finance leasing transaction.
 7. A fixed price purchase option of at least 10 percent of the original cost of the property is allowed.

Effective January 1, 1984 agriculture equipment can be leased under either the conventional (pre 1981 Act) rules, the finance lease rules, or the farm finance lease rules. It is likely that most agricultural equipment leases will continue to be under the farm finance lease guidelines, if the total volume of leases within the year fall within the \$150,000 limit. This is because the tax treatment of ITC credits and depreciation allowances is more favorable under the farm finance lease guidelines than under either of the alternatives.

In addition to the provisions relating specifically to leasing, the 1981 and 1982 Acts contain several general provisions relating to taxes which have had a major impact on agricultural leasing activity. These include a new system of depreciation referred to as the Accelerated Cost Recovery System (ACRS). The ACRS system establishes categories of assets in terms of the useful life of the asset. Almost all agricultural equipment is classified in the five-year category, except pickups, which are a three-year item. The ACRS system in the 1981 Act permitted depreciating the asset to a zero value. That is salvage value, for depreciation purposes, is zero. The 1981 Act also provided for investment tax credits (ITC) at the rate of two percent of new cost per year up to a maximum of 10 percent for five-year category items. This represents a significant liberalization of ITC rules as compared to the previous acts.

The 1982 Act retained the ACRS depreciation system but provided that the depreciable base of an asset be reduced by one-half of the ITC claimed. Alternatively an eight percent ITC can be claimed on a five-year item without affecting the depreciable base.

The 1981 Act also provided for capital expensing up to specified level with the depreciable base and the amount eligible for ITC being reduced by the amount of the capital expensing. The capital expensing provision was retained in the 1982 Act. However it has been shown that capital expensing is an optimal strategy only under a very limited set of circumstances involving very high discount and tax rates or highly variable incomes (Hamilton).

The impact on ownership costs of the 1982 Act relative to the 1981 Act as it applies to agricultural leases, is illustrated in Table 2 using farmer tax rules and assuming a 20 percent tax rate,

Table 2. Comparison of Farmer Ownership Costs and Break-Even Lease Rates, 1981 Act Vs the 1982 Act, 15 Percent Interest, 10 Percent Discount Rate, 20 Percent Tax Rate, and 25 Percent Residual Value, Farmer Tax Rules

ITEM	<u>YEAR</u>							TOTAL
	1	2	3	4	5	6	7	
	<u>1981 ACT-25% DOWN-FARMER</u>							
CASH FLOW	\$250.00	\$223.74	\$223.74	\$223.74	\$223.74	\$-26.26		\$1118.68
NET CASH FLOW	250.00	93.74	157.24	162.57	166.41	-79.18	44.16	794.95
PRESENT VALUE	250.00	85.22	129.95	122.14	113.66	-49.16	24.93	676.74
BREAK-EVEN LEASE RATE	198.36	198.36	198.36	198.36	198.36			991.78
	<u>1982 ACT-25% DOWN FARMER</u>							
CASH FLOW	\$250.00	\$223.74	\$223.74	\$223.74	\$223.74	\$-26.26		\$1118.68
NET CASH FLOW	250.00	95.24	159.44	164.67	168.51	-77.08	44.16	804.95
PRESENT VALUE	250.00	86.58	131.77	123.72	115.10	-47.87	24.93	684.23
BREAK-EVEN LEASE RATE	200.55	200.55	200.55	200.55	200.55			1002.77

a 10 percent discount rate, a 15 percent interest rate, and a 25 percent residual value. As Table 2 indicates, the farmer's present value of cost for providing ownership services is \$676.74 under the 1981 Act and \$684.23 under the provisions of the 1982 Act. The break-even lease prices are \$198.36 and \$200.55 respectively. It can be seen from the above that although the 1981 Act retained most of the safe harbor provisions of the 1981 Act as they apply to agriculture, the change in the depreciation rules raised ownership costs and break-even rates.

Lessor Vs Lessee Income Tax Treatment

Tax legislation and rules have an important bearing on almost all financial decisions. Both tax credits and tax deductions are associated with owning depreciable assets. Tax credits are credited against (deducted from) the tax liability of the individual or firm. Tax deductions are deducted from income in determining the taxable income. Thus a \$1.00 tax credit has a value to the individual or firm of \$1.00. A tax deduction of \$1.00 is worth 1.00 multiplied by the individual or firm tax rate (ignoring time discounting in both cases). Thus for an individual or firm in the 40 percent tax bracket a \$1.00 tax deduction has an undiscounted value of 40 cents compared to \$1.00 for a tax credit.

There are differences in tax regulations for farmers and other business people. One difference relates to the time that tax credits and deductions (tax benefits) are realized. Non-farm businesses are required to file quarterly tax estimates and to pay taxes quarterly based on the estimated income for the current year, or actual income for the previous year. Non-farmer tax returns for the year are filed on or before April 15 of the following year, assuming the fiscal year is the same as the calendar year. Penalties are imposed if the taxes due, based on the final return filed for the year, are greater than the amount paid on the basis of the quarterly estimates, unless taxes paid on the basis of quarterly estimates in the current year are equal to or greater than the amount due in the previous year. Thus tax benefits, in the case of the non-farm business, may be realized within the quarter that the event resulting in the tax benefits occurs. For example, if a non-farm business purchases an asset eligible for investment tax credit on January 1, that benefit could be reflected in the first quarter income estimate and tax payment.

Farmers, in general, have several options for filing income tax returns. One option is to file an estimate and pay the estimated tax on January 17, or 17 days after the end of the tax year, if the fiscal year does not coincide with the calendar year. The final return would then be filed on April 15. A second option is to file a return, and pay taxes due, on March 1. Probably most farmers elect the second option. Thus for an item purchased on the first day of the tax year, tax benefits would be recognized, in terms of impact on cash flow, as much as 14 months after the purchase of the asset. Since time has value, a given tax benefit has a greater value if it is realized immediately rather than later. As indicated, if both a farmer and non-farmer purchase a depreciable item on January 1, the tax benefit could be realized immediately by the non-farmer but as much as 14 months later by the farmer.

The value of tax benefit timing is illustrated in Table 3. The assumption is that both the farmer (lessee) and the lessor are on a calendar year basis, are in the same tax bracket, have the same discount rate, access to the same financing, and that an item costing \$1,000 in the five-year ACRS category is purchased on January 1, 1983. It is further assumed that the purchase is financed using a 25 percent down payment with the remainder financed at 15 percent APR interest over a five-year period, requiring annual payments. The residual (salvage) value at the end of the five-year period is assumed to be 25 percent.

As indicated in Table 3, the cash flow pattern and total cash flow are identical for the farmer and the lessor, given the assumptions outlined. The cash flow for 1983 (the first year) is the 25 percent down payment requirement. Cash flow for the years 1984, 1985, 1986, and 1987 are the annual payments, made on January 1 of each year to amortize the loan of \$750. The negative cash flow (income) of \$26.26 in 1988 is the payment less the assumed residual (salvage) value ($223.74 - 250.00 = -26.26$).

The net cash flow is cash flow less tax benefits. The net cash flow total is the same for the lessor and the farmer (lessee), but the net flow pattern is different because the farmer realization of tax benefits is delayed one year. For example in the first year (1983) the farmer net flow is the same as cash flow, while in the case of the lessor net flow is less than cash flow due to immediate realization of tax benefits including ITC, depreciation, and interest. In a similar manner the lessor realizes the depreciation recapture, based on the residual value, immediately (1989), while the effect of recapture is delayed one year in the case of the farmer.

A different pattern of net cash flows results in a difference in the present value of the costs of owning the asset, as shown in Table 3. All present values are calculated by discounting the net flows to their present values, defined as the year the asset is acquired. The present value of the cost of owning the \$1,000 asset the first year is \$250.00 in the case of the farmer compared to \$121.50 for the lessor. The present value of cost of providing ownership services over a five year period, given the assumptions enumerated, are \$684.23 and \$658.37 for the farmer and for the lessor respectively. Thus for a \$1,000 investment, given the other assumptions, the cost of providing ownership services can be as much as almost \$26 more for the farmer than for the lessor due solely to the manner in which tax rules are applied to farmers as compared to other business people. The difference is less when the equipment is purchased later in the year.

Given the present value (cost) of providing ownership services, the "break-even" lease rate can be calculated. The break-even lease rate is defined as the annual payment, to be made for five years with the first payment made when the equipment is delivered, that

Table 3. Effect of Farmer Tax Rules, Compared to Non-Farmers, On Ownership Costs
& Break-Even Lease Rates 15 Percent Interest, 10 Percent Discount Rate,
20 Percent Tax Rate, And 25 Percent Redisual Value.

ITEM	YEAR							TOTAL
	1 1983	2 1984	3 1985	4 1986	5 1987	6 1988	7 1989	
LESSOR TAX RULES-1982 ACT								
CASH FLOW	\$250.00	\$223.84.	\$223.74	\$223.74	\$223.74	\$ -26.26		\$1118.68
NET CASH FLOW	121.50	159.44	164.67	168.51	172.92	17.90		804.95
PRESENT VALUE	121.50	144.94	136.09	126.61	118.11	11.11		658.37
<u>BREAK-EVEN LEASE ANALYSIS</u>								
CASH FLOW	\$197.36	\$197.36	\$197.36	\$197.36	\$197.36			\$986.79
NET CASH FLOW	157.89	157.89	157.89	157.89	157.89			789.43
PRESENT VALUE	157.89	143.53	130.48	118.62	107.84			658.37
FARMER TAX RULES-1982 ACT								
CASH FLOW	\$250.00	\$223.74	\$223.74	\$223.74	\$223.74	\$-26.26		\$1118.68
NET CASH FLOW	250.00	95.24	159.44	164.67	168.51	-77.08	44.16	804.95
PRESENT VALUE	250.00	86.58	131.77	123.72	115.10	-47.86	24.93	684.23
<u>BREAK-EVEN LEASE ANALYSIS</u>								
CASH FLOW	\$200.55	\$200.55	\$200.55	\$200.55	\$200.55			\$1002.77
NET CASH FLOW	200.55	160.44	160.44	160.44	160.44	-40.11		802.22
PRESENT VALUE	200.55	145.86	132.60	120.54	109.59	-24.91		684.23

results in a present value of lease payment or receipts equal to the present value of the cost of providing ownership services.^{1/} From the viewpoint of the farmer it is the highest lease payment that would be considered, given the cost of providing ownership services. The lessor "break-even" rate is the lowest value that the lessor would consider, given the assumptions. Thus any lease rate higher than the lessor break-even and lower than the farmer break-even could be advantageous to both parties. In the example case, any lease rate greater than \$196.36 per year and less than \$200.55 per year would compensate the lessor for providing ownership services and make the equipment available to the farmer at a cost less than the cost of the farmer providing ownership services. In actual practice the break-even rate for the lessor may be higher due to administrative costs involved. It should also be noted that for purchases made later in the year, the difference would be smaller and there would be no difference in the case of an end of the year purchase.

To this point only the cost side of the tax rules question has been addressed. If the purchased or leased asset results in the generation of additional income, the income side must also be considered. In that case the lessor may find it necessary to recognize the additional income before it would be recognized by the farmer (lessee). Thus if the asset under consideration results in the generation of additional income, the tax rules would tend to favor the farmer. Although the income side of the tax question is a relevant one, it should be noted that in choosing between owning and renting, the income can properly be considered to be the same for the two options. Thus for purposes of choosing between leasing and owning, the income side can often be ignored.

Although it is true that non-farm businesses are required to file quarterly income estimates and to pay taxes based on the estimate, in practice the previous year's income is typically used as an estimate of income during the current year. This is the case because no penalty is imposed for late payment of taxes if the amount paid during the current year is no less than the tax liability of the previous year. Thus if taxable income in the current year is anticipated to be no less than that for the last year, the incentive is to file quarterly estimates and to pay based on the taxable income for the previous year.

^{1/} The "lease Break-Even" computations for a five year item, are defined as follows:

$$\text{Present Value of ownership costs} = \sum_{i=0}^4 \frac{L(1-T)}{(1+D)^i}$$

and solve for L, where:

L = Break-even lease rate

T = Marginal income tax rate

D = Discount rate

i = time periods (years)

On balance, the tendency is to overestimate the importance of the tax rules for farmers vs. non-farmers. That is, the tax rules for farmers, compared to other business people, probably has little impact on the lease vs purchase decision. This is the case because for items purchased late in the year there is no basis for even a theoretical difference, and in practice most firms likely file and pay based on income for the previous year. Thus, in the remainder of this investigation, lessor tax rules, that is current recognition of costs, is assumed. This may tend to slightly underestimate the farmer cost of ownership and break-even lease rate. However in practice, the discrepancy is relatively small.

FACTORS AFFECTING OWNERSHIP COSTS

Machinery and equipment are the most commonly leased depreciable agricultural production assets. However fixed structure leasing, particularly grain storage bins, has been quite popular and the volume of leasing in that area grew rapidly over the last two or three years. In many respects it is easier to calculate ownership costs and to evaluate leases for machinery, equipment, and fixed structures than for livestock. Nevertheless care should be exercised in making such calculations to assure that accurate comparisons are made in evaluating a financial lease as an alternative to ownership. In this section the factors affecting ownership and break-even lease costs are examined.

Ownership is the relevant alternative to lease financing. Thus the first step in evaluating a lease is to determine ownership costs, assuming that the item is purchased. Major factors affecting ownership costs are the original cost of the asset, the finance plan, the tax bracket of the owner, the discount rate, and the anticipated salvage value of the asset at the end of the planned use period. Ownership costs may be different for the lessor and the lessee due to differences in available finance plans as well as different purchase costs, tax rates, tax filing rules, discount rates, and salvage values. In the analyses of these factors, lessor tax rules are assumed. Thus tax credits and benefits are assumed to be realized currently. In all cases the asset cost is assumed to be \$1,000.

The Finance Option

The finance options available can have a major impact on ownership costs. The importance of the finance option on ownership costs assuming lessor tax rules, can be illustrated by comparing three different plans. For each of the three finance plans, a purchase cost of \$1,000 is assumed with a 20 percent tax rate, a 10 percent discount rate, and a salvage value equal to 25 percent of the purchase cost. Given these assumptions, three finance options are evaluated. These are a 25 percent down payment plan with the balance amortized over a five-year period with five equal annual payments, a cash purchase, and finally five equal annual payments with the first payment made upon delivery with the four additional payments being made at one year intervals.

Each of the three finance plans is detailed and analyzed in Table 4. The plan involving a 25 percent down payment, with the balance being amortized over a period of five years in equal annual payments, is likely the most commonly used finance plan in acquiring depreciable agricultural assets. The cash flow consists of the down payment in the purchase year, with five equal annual payments including both principal and interest, and finally, at the end of the period the 25 percent salvage value is credited to cash flow. Thus the total cash flow for the acquisition is \$1,118.68.

Net cash flow is the cash flow less tax benefits. It is assumed that all tax benefits are realized currently. The present value of the net cash flow is shown for each year of the period, along with the total present value which is \$658.37. This amount represents the present value (of costs), given the discount rate of 10 percent and other assumptions, of the cost of owning a \$1,000 asset over the five year planning period.

The cash flow in the break-even lease analysis is the annual before tax lease payment that results in an after tax present value equal to the present value of ownership. Lease payments can be expensed, for tax purposes, each year. Thus tax benefits are simply the cash flow times the tax rate. The present value for the various years and the total are provided for comparison with the purchase present values. The only meaningful present value entry is the total which, by definition, is equal for the lease and the purchase option.

These same analyses are provided for the cash purchase option and for the five equal payments option. In the case of the cash purchase, the cash flow totals \$750.00. The present value of the cost of the purchase is \$619.11, and the break-even lease rate, from the viewpoint of the lessor is \$185.59. In the same fashion, using the five equal payments finance plan, the cash flows total \$1,047.02 and the present value is \$688.30, and the break-even lease rate from the viewpoint of the lessors \$195.39.

For an individual who has access to the three options described, the lowest cost purchase finance plan, given the assumptions, is the cash purchase. Thus in this particular case, the cash purchase is the plan with which the lease option should be compared. Given the assumptions, and ignoring tax filing rules differences, the farmer would be indifferent between leasing at \$185.59 per year and the cash purchase. If the quoted lease rate is less than \$185.59 it would be financially wise to lease. At lease rates above \$185.59 it would be best to purchase the asset.

In evaluating the above illustration, it must be kept in mind that it is essential that the relevant finance plans be analyzed. Not all potential lessees have access to sufficient equity capital to finance cash purchases. Further the results given above are not general because the cost of the finance plan is dependent, among other things, on the discount rate and the interest rate used.

Tax and Interest Rates

Interest rates affect the cost of providing ownership services if debt capital is used in acquiring the asset. Thus an individual who has debt capital available at a lower interest rate and/or better terms than another individual, other things being equal, will experience a lower cost of providing ownership services.

Table 4. Impact of The Purchase Finance Plan on the Break-Even Lease Rate, Lessor Tax Rules, 1982 Act

ITEM	YEAR						Total
	1	2	3	4	5	6	
<u>I - 25% Down - Five Payments</u>							
CASH FLOW	250.00	223.74	224.74	223.74	223.74	-26.26	1118.68
NET CASH FLOW	121.50	159.44	164.69	168.57	172.92	17.90	804.95
PRESENT VALUE	121.50	144.91	136.09	126.61	118.11	11.11	658.37
<u>BREAK-EVEN ANALYSIS</u>							
CASH FLOW	197.36	197.36	197.36	197.36	197.36		986.79
NET CASH FLOW	157.89	157.89	157.89	157.89	157.89		789.43
PRESENT VALUE	157.89	143.53	130.48	118.42	107.84		658.37
<u>II CASH PURCHASE</u>							
CASH FLOW	1000.00	0.00	0.00	0.00	0.00	-250.00	750.00
NET CASH FLOW	871.50	-41.80	-39.90	-39.90	-39.90	-200.00	510.00
PRESENT VALUE	871.50	-38.00	-32.98	-29.98	-27.25	-124.18	619.11
<u>BREAK-EVEN LEASE ANALYSIS</u>							
CASH FLOW	185.59	185.59	185.59	185.59	185.59		927.95
NET CASH FLOW	148.47	148.47	148.47	148.47	148.47		742.36
PRESENT VALUE	148.47	134.98	122.70	111.55	101.41		619.11
<u>III ZERO DOWN - FIVE PAYMENTS</u>							
CASH FLOW	0.00	298.32	298.32	298.32	298.32	48.32	1241.58
NET CASH FLOW	-128.50	226.52	282.87	237.98	243.83	90.53	903.26
PRESENT VALUE	-128.50	205.92	192.45	178.80	166.56	56.21	671.45
<u>BREAK-EVEN LEASE ANALYSIS</u>							
CASH FLOW	201.28	201.28	201.28	201.28	201.28		1006.40
NET CASH FLOW	161.02	161.02	161.02	161.02	161.02		805.12
PRESENT VALUE	161.02	146.39	133.08	120.98	109.98		671.45

The marginal income tax rate also plays an important role in determining the present value of ownership costs. Thus the tax bracket of the potential lessor relative to that of the lessee can be important in determining lease feasibility. This is the case because tax credits and tax deductions have a greater value, in reducing the cost of providing ownership services, for an owner in a higher tax bracket than for an owner in a lower tax bracket. Marginal income tax rates, including both federal and state, can range from zero to over 50 percent, not including social security taxes. Thus the marginal tax rate has the potential to be a major factor determining leasing feasibility.

Table 5 demonstrates the importance of the interest rate and the marginal tax rate in determining the present value of the cost of providing ownership services and on the break-even lease rate. Again a \$1,000 asset, a 10 percent discount rate, a finance plan involving 25 percent down and five equal annual payments, a 25 percent residual value, and lessor tax rules under the 1982 Act are assumed. It will be noted that for a given interest rate, the tax rate has no effect on total cash flow. Tax rates have a profound impact on net cash flow, the present value of the cost of providing ownership services, and on the break-even lease rate. For example, assuming a 15 percent interest rate, the present value of the cost of providing ownership services is \$942.91 for a zero tax rate compared to \$381.55 for a 50 percent tax rate. The corresponding break-even lease rates are \$226.12 and \$183.01 respectively.

Ignoring possible differences in costs due to differences in tax rules, a lessor in the 50 percent tax bracket could offer a lease on the asset at the rate of \$183.01 per year over the five-year period. By the same token a potential lessee in the zero tax bracket could pay as much as \$226.12 per year over a five-year lease period and be indifferent between leasing and buying in terms of the present value of costs. Thus it is apparent that the range of lease rates that could be advantageous to both the lessor and the lessee can be quite large when the lessor is in a higher tax bracket than is the lessee.

Interest rates also play a major role in determining the present value of the cost of providing ownership services. Note that the interest rate affects cash flow, net cash flow, present value of costs, and the break-even lease rate, for all tax rates. Higher interest rates increase each of these values, for each tax rate. However the impact of interest rates on the present value of costs is greater at lower tax rates. The explanation for this is that in the higher tax brackets, the effect of higher interest charges are offset by higher tax benefits than is the case in lower tax brackets.

If the lessor is in a higher tax bracket than the lessee and has access to debt capital at a lower interest rate than the lessee, the lease bargaining range (the range of lease rates that could be advantageous to both the lessor and the lessee) can be quite large. Consider, for example, a lessor in the 50 percent tax bracket with access to capital at a 10 percent rate and a potential lessor in the zero tax bracket whose cost of capital is 20 percent. Given these circumstances, any lease rate more than \$160.59 and less than \$250.71 could be advantageous to both parties, other things equal.

Table 5. Effect of Interest Rates and Tax Rate on Cash Flows, Present Value, and Break-Even, \$1,000 Asset, 10 Percent Discount Rate, and 25 Percent Residual Value, 25 Percent Down Finance Plan, Lessor Tax Rules, 1982 Act.

Tax Rate and Variables	Interest Rate		
	10%	15%	20%
<u>Zero Tax Rate</u>			
Cash Flow	\$989.24	\$1118.68	\$1253.92
Net Cash Flow	989.24	1118.68	1253.92
Present Value	844.77	942.91	1045.44
Break-Even Lease Rate	202.59	226.12	250.17
<u>20 Percent Tax Rate</u>			
Cash Flow	\$989.24	\$1118.68	\$1253.92
Net Cash Flow	701.39	804.95	913.14
Present Value	580.79	658.37	739.51
Break-Even Lease Rate	174.10	197.36	221.68
<u>50 Percent Tax Rates</u>			
Cash Flow	\$989.24	\$1118.68	\$1253.92
Net Cash Flow	419.62	484.34	551.86
Present Value	334.82	381.55	430.62
Break-Even Lease Rate	160.59	183.01	206.54

Residual Value And Discount Rate

The discount rate is the opportunity cost of capital, or the rate of return that can be earned in the most profitable investment with an equivalent risk level. In general, individuals with limited capital resources would be expected to use a higher discount rate than persons with less limited capital.

Table 6 shows the effects of the discount rate on the cost of providing ownership services and the break-even lease rate. Again, a \$1,000 item, a 20 percent tax rate, a 15 percent interest rate, a 25 percent down payment plan, and lessor tax rules under the 1982 Act are assumed. The discount rate has no effect on cash flow or net cash flow. However since the discount rate is a measure of the time value of money, it does affect the present value of providing ownership services. For example, assuming a 25 percent residual value, the present value of providing ownership services is \$658.37 over the five year period assuming the 10 percent discount rate. This compares to 387.42 assuming a 50 percent discount rate. The break-even lease cost per year is \$197.36 assuming a 10 percent discount rate compared to \$185.92 with a 50 percent discount rate. Thus, in making the lease vs purchase decision, the discount rate, within usual ranges, is of rather minor importance. The reason for this is that the patterns of net cash flow are not greatly different for the purchase and lease options.

The residual or salvage value is the anticipated market value of the asset at the end of the ownership or lease period. Here it is expressed as a percent of the new cost of the item. In leasing agreements involving a purchase option, the residual percentage used may or may not reflect the actual anticipated market value of the item. However, in evaluating leasing vs owning the potential lessee should be concerned with the residual percentage in the purchase option. This is the case because at the end of the lease period the item can be purchased or not, depending on market conditions.

The anticipated residual value affects cash flow, net cash flow, the present value of providing ownership services, and the break-even lease rate. Cash flow, net cash flow requirements, the present value of providing ownership services, and the break-even lease rate decline as the residual value increases as shown in Table 6. From the viewpoint of the potential lessee, in general, the higher the residual value the more favorable the annual lease rate. However the lessor, in order to protect his interest, will seek to limit the residual percentage in the contract.

The lowest residual percentage for a purchase option permitted by the current legislation is 10 percent, and the practical range in the machinery industry is 10-50 percent of new cost. However, there is a great deal of variation, depending on the anticipated life and market value of the specific item under consideration.

Computer Routines

As mentioned earlier, the calculations associated with estimating ownership costs and break-even lease rates can be expedited by use of a mini (personal) computer. A VisiCalc Template that performs the calculations, given the user inputs and assumptions, is available from Oklahoma State University. More information regarding the Oklahoma State University template is available from the area extension farm management agents, or by

Table 6. Effect of Discount Rate and Residual Value on Cash Flows, Present Value and Break-Even \$1,000 Asset, 20 Percent Tax Rate, 15 Percent Interest Rate, 25 Percent Down Finance Plan, Lessor Tax Rules, 1982 Act.

Residual Percent and Variables	Discount Rate		
	10%	15%	50%
<u>10 Percent Residual Value</u>			
Net Cash Flow	\$1268.68	\$1268.68	\$1268.68
Net Cash Flow	924.95	924.95	924.95
Present Value	732.88	662.89	403.23
Break-Even Lease Rate	219.69	214.95	193.49
<u>25 Percent Residual Value</u>			
Cash Flow	\$1118.68	\$1118.68	\$1118.68
Net Cash Flow	804.95	804.95	804.95
Present Value	658.37	603.23	387.42
Break-Even Lease Rate	197.36	195.60	185.92
<u>50 Percent Residual Value</u>			
Cash Flow	\$ 868.68	\$ 868.68	\$ 868.68
Net Cash Flow	604.95	604.95	604.95
Present Value	534.18	503.79	361.09
Break-Even Lease Rate	160.13	163.36	173.27

Table 7. Effect of Interest Rate and Discount Rate on Cash Flows, Present Value, and Break-Even, \$1,000 Asset, 20 Percent Tax Rate, 25 Percent Residual Value, 25 Percent Down Finance Plan, Lessor Tax Rules, 1982 Act.

Interest Rate and Variables	Discount Rate		
	10%	15%	50%
<u>10 Percent Interest Rate</u>			
Cash Flow	\$989.24	\$989.24	\$989.24
Net Cash Flow	701.39	701.39	701.39
Present Value	580.79	535.00	353.13
Break-Even Lease Rate	174.10	173.48	169.45
<u>15 Percent Interest</u>			
Cash Flow	\$1118.68	\$1118.68	\$1118.68
Net Cash Flow	804.95	804.95	804.95
Present Value	658.37	603.73	387.42
Break-Even Lease Rate	197.36	195.60	185.91
<u>20 Percent Interest</u>			
Cash Flow	\$1253.92	\$1253.92	\$1253.92
Net Cash Flow	913.14	914.14	913.14
Present Value	739.51	674.73	423.45
Break-Even Lease Rate	221.68	218.75	203.19

writing to the Department of Agricultural Economics at Oklahoma State University.

OTHER CONSIDERATION

Once the cost analyses have been completed, it is proper to consider some of the qualitative and/or other factors not directly included in the cost analysis. These considerations might include items such as personal preferences, degree of risk, possible changes in the decision parameters, and flexibility .

Market Risk

One of the uncertainties involved in owning equipment is the market and/or trade in value of the equipment at the end of the planned ownership period. Factors considered include the rate of general inflation, obsolescence, and the market demand for used items of the class under consideration. In the case of a purchase, the owner bears the risk of prices lower than those expected and reaps the benefit of prices of used equipment higher than expected.

In the case of leased equipment, prior to the time that purchase options were permitted in leases, the lessee did not suffer the loss of lower than expected prices nor benefit from higher than expected prices of used items. However with current rules permitting purchase options at a fixed price, the lessee can exercise the purchase option and benefit from higher than expected used equipment prices. By the same token the lessee can decline to exercise his purchase option and thus avoid the consequence of lower than expected used equipment prices. Obviously the lessee's ability to exercise the purchase option is dependent on the financial stability of the lessor.

Inflation is one of the forces affecting the market price, in current dollars, of used equipment. Thus leases with purchase options protect the lessee as described above. The same can be said for obsolescence. However as indicated earlier, lessors are aware of the obsolescence factor and therefore reflect it in the lease rate quoted. Nevertheless it appears that, with current lease rules, the lessee is better protected from market price risks of used items than is the lessor.

The residual percentage quoted in the lease may, or may not, reflect accurately the anticipated price of the item at the end of lease period. This is obviously the case, since many major lessors now offer the same equipment with different residual percentages even though the periods of the leases are the same, although the lease rate is different. Thus the question arises as to what residual percent should be used in calculating ownership costs? Should the prospective lessee use the residual percent which reflects his expectation of the actual salvage price, or should he use the residual percent quoted in the lease?

In general, in comparing leasing with owning, one should use the residual percent included in the proposed lease in estimating ownership costs. This approach will put the buy vs. lease options on a comparable basis. However if the residual percent used in the proposed lease is higher than the expectations of the potential

lessee, it should be clear that the used item market risk of the purchase option may be a significant consideration in the buy vs. lease decision.

Personal Preferences

It is generally conceded that there are certain qualitative advantages and disadvantages associated with the lease vs. buy decision. Although such items tend to be relatively minor, they must be recognized and considered. Some examples include the pride of ownership issue, the accounting convenience of a lease, and the lack of familiarity with leasing terms and analyses. These factors may tend to cause decision makers to ignore certain alternatives. A better approach is to analyze the decision from a financial viewpoint, then to determine how much the exercise of a qualitative preference is likely to cost in financial terms.

There is no doubt that farmers, like other business people, take personal pride in their property. However since leasing gives the manager complete and exclusive control of the property during the period of the lease, it may be rational to take pride in controlling quality equipment rather than owning it, if leasing appears to be the best financial decision. It follows that there is no particular merit or prestige in leasing if ownership is less expensive from a financial viewpoint.

In general lease payments are a deductible expense for tax purposes in the case of both federal and state income taxes. Thus leasing avoids the necessity of maintaining depreciation accounts, interest payments, and other tax related details associated with ownership. How much this convenience is worth is a matter of judgement on the part of the decision maker. In any event, if the financial analysis suggests that ownership is the most economic mode of controlling the equipment in question, the decision maker is made aware of the amount being paid for the convenience of leasing.

Some managers suggest that leasing is not well understood, therefore there is a lack of knowledge regarding how to evaluate a lease. However, since leasing should be considered as an alternate to ownership, little additional analysis is needed to evaluate the financial aspects of the lease vs. purchase decision. There are, of course, numerous purchase options. Currently many incentive plans and/or premiums are being offered to encourage farmers to buy equipment now. Availability of the various finance plans requires that the cost of owning the equipment, using the different combinations of finance plans and incentive premiums, requires determining the cost of the various finance options offered. Once this has been done, determining the relative financial implications of leasing vs. buying is a relatively simple matter.

Flexibility

The preceding analyses have shown that the tax rate and the interest rate are the major factors likely to affect leasing feasibility. As income changes, the tax rate will also change. Thus in calculating ownership costs as a basis for determining the lease break-even rate, it is probably wise to use an anticipated average tax rate over the period under consideration rather than the actual rate for the last year or the anticipated rate for the next year. To use a rate lower than the normal rate is likely to make

leasing appear more attractive than the actual case while a higher than normal rate will make the leasing alternative appear less attractive than is the actual case.

Flexibility is one strategy that managers use to offset the adverse aspects of risk and uncertainty. Both the purchase and lease options involve fixed obligations in terms of either lease or finance payments. It is difficult to defer either finance or lease payments in the event of adverse developments that limit cash flow availability. The purchased item can often be sold if necessary. Further, in the event that larger machinery is needed before a lease period ends, it is usually possible to use the purchased equipment as a partial payment on the new equipment. In a similar fashion, lessors will often cancel an existing lease when a new lease or purchase is negotiated. This is an aspect of the lease agreement that should be investigated before the lease is consummated. Thus on balance, there is probably no real difference in leasing and owning with respect to the question of flexibility.

SUMMARY AND CONCLUSIONS

Although leasing of depreciable assets is a relatively new concept for agricultural managers, leasing of agricultural assets is growing at a rapid rate. Farmers and ranchers are leasing, rather than buying, trucks, tractors, implements, storage facilities, and livestock. Leases on farm assets are being offered by manufacturers, banks, dealers, and in some areas of the country, by Production Credit Associations. Although several reasons for leasing or not leasing are commonly enumerated, the major consideration in choosing between leasing and buying is anticipated costs, or more accurately the present value of costs. This publication demonstrates how ownership costs may be calculated. Given ownership costs, the break-even lease rate can be calculated. In addition, the variables affecting leasing feasibility are examined.

Non-farm business people have used leasing extensively as a means of controlling capital assets. It is not clear why farmers have only recently begun to lease depreciable assets. In any event recent changes in the tax codes relating to leasing have made the leasing alternative relatively more attractive. One very significant recent change is one that permits including a fixed price purchase option in the leasing agreement. This new provision, in effect, removes the risk associated with changes in the value of the leased item over the lease period, and in general reduces uncertainty on the part of the lessee.

Leasing is a financial management strategy for controlling the use of an asset over a relatively long time period. Leasing should not be confused with renting which involves very short term use and control of assets. Leasing is an alternative to ownership. Thus in order to make an informed decision regarding leasing vs ownership, it is necessary to compare ownership costs with leasing costs. There are certain other considerations in making the choice, but the relative cost of ownership vs leasing is the basic decision guide.

The break-even lease rate is the lease payment that results in the same present value of costs as ownership. Given the break-even lease rate, based on estimated ownership costs, the manager would be indifferent, from a cost viewpoint, between leasing at the break-even rate and owning. Thus if a lease is offered at an amount less than the break-even rate, leasing would be the preferred option. Otherwise ownership would be the best choice, other things equal.

Farmers file returns and pay federal income taxes on a slightly different basis than other business people. Thus, there is a possibility that farmers may recognize tax benefits associated with a capital investment later than other business people. Consequently other things equal, farmer ownership costs and break-even lease rates may be slightly higher than for potential lessors. However the impact of any lag in farmer realization of tax benefits is often overstated.

The analysis in this research shows that the interest rate and tax rate of the lessor compared to the potential lessee are the primary bases for a mutually advantageous lease arrangement. This is because tax benefits have a greater value to an individual or firm in a high tax bracket as compared to one in a low tax bracket. Consequently if the lessor is in a relatively high tax bracket and the farmer is in a lower tax bracket, there is a basis for a mutually advantageous lease arrangement. In a similar manner, if the lessor has access to debt capital at rates and terms more favorable than those available to the farmer, there is often a sound economic basis for a lease agreement offering advantages to both parties.

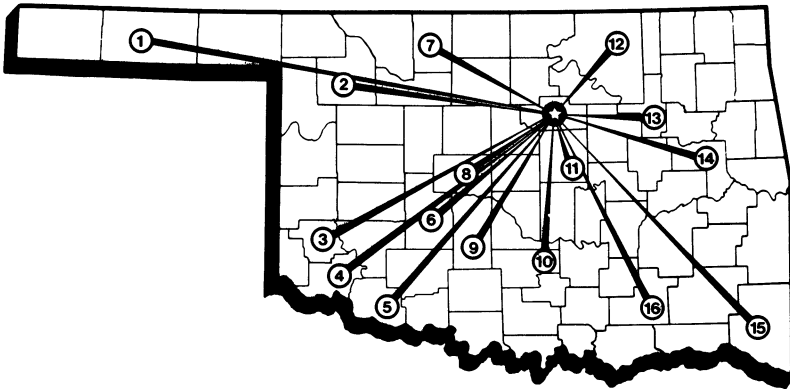
The relative discount rate of the farmer and the lessor is relatively unimportant in determining the feasibility of a lease. The anticipated salvage value, or more accurately the residual value in the lease agreement, can be important to the lessee. In general, from the lessee's viewpoint, a lease with a high residual value is most advantageous. High residual values tend to reduce cash flow in the early years relative to the latter years, thus reducing the present value of costs of the lease. However if this advantage is offset by a higher lease rate, as it often is, then the advantage is lost.

For the farmer or rancher contemplating the acquisition of new or additional assets, perhaps the best advice is, determine the ownership costs (present value of costs), and calculate the break-even lease rate. After this has been done, the more subjective considerations may be evaluated.

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