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ECONOMIC PROFILES FOR CORN, HAY AND PASTURE; 1982 AND FIVE YEAR AVERAGE 1978-82



by

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TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
CONSTRUCTION OF ECONOMIC PROFILES	2
Computer Calculation of Economic Profiles	4
Yield	4
Price	5
Value of Production	8
Growing Expenses	8
Harvesting Expenses	12
Labor Requirements	12
Other Variable Costs	13
Fixed Expenses	14
Return to Land	18
REFERENCES	19
ECONOMIC PROFILES, SOIL GROUPS 1-8	21
APPENDIX A DETAILED POWER AND EQUIPMENT CALCULATIONS	37
APPENDIX B DETAILED CROP PRICE CALCULATIONS	42

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INTRODUCTION

Enacted by the New York State legislature in April 1980, Chapter 79 of the Laws of 1980 altered the procedures for valuing qualified farmland in real estate tax calculations. The valuation procedure was changed by this legislation from a market base to an income capitalization approach. Stipulated in the legislation was a land classification system to be developed and administered by the New York Department of Agriculture and Markets. The State Board of Equalization and Assessment was directed to calculate land values for each soil group in the land classification system. The State Board of Equalization and Assessment was to use the income capitalization approach based on economic profiles developed by the New York State College of Agriculture and Life Sciences at Cornell University.

The income capitalization approach was first implemented in 1981. Economic profiles for 1975 through 1979, 1976 through 1980, and 1977 through 1981 have been constructed for corn, hay and pasture and conveyed to the State Division of Equalization and Assessment.¹ Economic profiles for fruit, Long Island potatoes and vegetables grown on muckland have also been constructed and conveyed to the State Division of Equalization and Assessment.² Agricultural use values have been based on these economic profiles for most crops and soil groups.

¹Knoblauch, Wayne A. and Robert A. Milligan, Economic Profiles for Corn, Hay and Pasture, A.E. Ext. 81-1, Department of Agricultural Economics, Cornell University, January 1981; Knoblauch, Wayne A. and Robert A. Milligan, Economic Profiles for Corn, Hay and Pasture, A.E. Ext. 81-23, Department of Agricultural Economics, Cornell University, October 1981; and Knoblauch, Wayne A. and Robert A. Milligan, Economic Profiles for Corn, Hay and Pasture, A.E. Ext. 82-31, Department of Agricultural Economics, Cornell University, October 1982.

²State Board of Equalization and Assessment, Report on the Proposed 1981 Farmland Use Values for Agricultural Assessment in New York, January 9, 1981; State Board of Equalization and Assessment, Report on the Proposed 1982 Farmland Use Values for Agricultural Assessment in New York, January 9, 1982; and State Board of Equalization and Assessment, Determination of Proposed 1983 Agricultural Use Values, December 1982.

Agricultural land values are calculated by the State Division of Equalization and Assessment. They consider corn, hay and pasture and fruit and vegetable economic profiles. Information on the procedure for determining agricultural land values has been contained in a report by the State Board of Equalization and Assessment¹ and will be in the Report on the Proposed 1984 Farmland Use Values for Agricultural Value Assessment in New York to be published early in 1984.

The purpose of this bulletin is to explain how economic profiles for corn, hay and pasture were constructed for 1982 and the five-year average, 1978 through 1982. In this document, the term "economic profile" refers to the information required to determine the return to land for one high- or low-lime soil group. A description of the construction of economic profiles using a series of tables that contain the most important parameters utilized dominates the discussion.

In total, 14 economic profiles were constructed for eight soil groups. Economic profiles for high-lime and low-lime for Soil Groups 1 through 6 and an economic profile for low-lime for Soil Groups 7 and 8 are required. High-lime soil mapping units are almost nonexistent in Soil Groups 7 and 8. For all except Soil Group 8 the economic profile consists of an enterprise budget for corn and an enterprise budget for hay with the net income for each soil group's economic profile being weighted by the specified rotation. Soil Group 8's economic profile is based on permanent pasture.

CONSTRUCTION OF ECONOMIC PROFILES

The enterprise budgets utilized to compute economic profiles were constructed using the economic engineering approach. Enterprise budgets are designed to represent the internal and external crop related characteristics of an average farm in the State. The principal internal characteristic is the soil group; other internal characteristics of importance include

¹See footnote 2, page 1.

total crop acres, acreages of each crop, the machinery complement, and a specification of an average level of management. External characteristics are incorporated through the use of average State input and output prices. The budgets, consequently, are not an average of actual farm observations. All of the data used in constructing the enterprise budgets is based wholly or partially upon published or unpublished surveys, observation or other methods of collecting information.

For each crop, two sets of enterprise budgets are prepared. The first is constructed for the year 1982. The second is for 1978 through 1982. Input prices were obtained from surveys and using data published in Agricultural Prices and New York Agricultural Statistics. Output prices are also for crop year 1982 and a five-year average and are based on data in New York Agricultural Statistics. Input levels and yields are held constant for 1982 and 1978 through 1982 enterprise budgets.

The years 1978 through 1982 are used as the basis for determining net returns to land for two reasons. First, use of data for only one year could lead to wide fluctuations in net returns because of changes in prices and costs. The five-year average period is consistent with the period used for computing the five-year average effective interest rate on new Federal Land Bank loans made in the Springfield District which is used as the capitalization rate as defined in the 1980 Agricultural Districts legislation. Second, the 1978 through 1982 time period is the most recent possible because some of the data for the 1983 crop year are not available to meet deadlines for computing 1984 agricultural values.

Details of the methodology are illustrated by describing the procedure used to construct the economic profile for Soil Group 1, low-lime (page 32). Although focusing primarily on this economic profile, the discussion indicates how the procedure was used and is directly transferable to the other

profiles. Tables containing supporting information are referenced throughout the discussion. The 14 economic profiles are contained in the next section of this report on pages 21-36.

Computer Calculation of Economic Profiles

This year the calculations for the economic profiles were performed on a microcomputer using an electronic spreadsheet software package. The name "electronic spreadsheet" comes from similarity to a paper spreadsheet on which calculating tasks are set up as tables of columns and rows of figures. These rows and columns are titled, cross referenced, and manipulated mathematically. An electronic spreadsheet package arranges the computer's memory as an "electronic sheet". The calculations are performed based on formulas stored in the microcomputer's memory.

Yield

For each soil group, the yield specified is for corn silage and hay obtainable under average management. The basis for these yields is prudent management for each soil mapping unit. Prudent management yields are derived from published Soil Surveys, Soil Conservation Service Form 5 Reports and from Cornell research. Prudent management yields for each soil group are multiplied by a conversion factor to obtain average management yields (Table 1). The difference between conversion factors and 1.0 represents yield reduction due to harvesting loss, field size loss (the necessity of headlands and end rows), and a reduction from prudent to average management. Yields used in the construction of economic profiles for Soil Group 1 are 18.4 tons of corn silage and 3.8 tons of dry hay per acre (Table 2). Yield per acre decreases and rotations contain fewer years in corn as the soil group number increases. For each soil group, yields are identical for high-lime and low-lime soils.

TABLE 1.

FACTORS FOR CONVERTING PRUDENT MANAGEMENT YIELD
TO AVERAGE HARVESTED YIELD PER CROP ACRE BY SOIL GROUP¹

Soil Group	Corn	Hay and Pasture
1	0.75	0.67
2	0.75	0.67
3	0.75	0.67
4	0.75	0.67
5	0.74	0.66
6	0.73	0.65
7	0.72	0.64
8	--	0.48

¹Factors were multiplied by prudent management yields to obtain average harvested yield per crop acre. The factors are comprised of three components: harvesting loss, field size loss, and conversion from prudent to average management.

TABLE 2.

CORN AND HAY YIELD PER ACRE BY SOIL GROUP

Soil Group	Corn	Hay
	tons/acre	tons/acre
1	18.4	3.8
2	17.4	3.6
3	16.1	3.3
4	14.4	2.9
5	13.3	2.7
6	11.3	2.2
7	9.7	1.6
8	---	1.0

Price

The calculation of total revenue requires a price that could be obtained for the product at harvest time as it is ready to leave the farm. A

large proportion of the hay and corn crops produced in New York State, however, are fed to livestock on the farm, making difficult the determination of such a price. Several adjustments must be made to published prices to obtain a harvest time farmgate price.

Corn prices are based on prices published in New York Agricultural Statistics. The unadjusted weighted price is calculated from the weighted average of corn silage and corn grain prices, based on acreage of each in the State each year, then converted to a corn silage price (Table 3). Adjustments are required to represent a farmgate price. The adjustment to the corn silage price includes the annualized investment cost of a silo for storage because the published price represents the price of the corn silage in a silo. Corn grain price is adjusted for the cost of transportation from the farmgate to market and a drying cost for half the crop that did not already have a drying cost deduction included in the published net price. The farmgate price adjustment was then subtracted from the average unadjusted price for 1978 through 1982 and applied to corn grown on all soil groups.

TABLE 3.
CORN SILAGE PRICES

Year	Unadjusted Weighted Price ¹	Adjustment ²	Weighted Farmgate Price
	\$ per ton	\$ per ton	\$ per ton
1978	16.05	---	---
1979	18.05	---	---
1980	20.20	---	---
1981	18.00	---	---
1982	18.06	2.19	15.87
1978-1982	18.04	1.87 ³	16.17

¹Weighted average of corn silage and corn grain prices based on acreage of each in the State each year converted to a silage price.

²Adjustments include: storage costs for corn silage, marketing and transportation costs for corn grain, and drying costs for one-half of the corn grain. These adjustments are weighted based on acreage of silage and grain in the State and converted to a silage price.

³Computed using previous year's adjustments and cost index factors.

Hay prices are based on prices for "alfalfa hay baled" published in New York Agricultural Statistics (Table 4). The quality of the hay crop is higher for better quality soils, as better quality soils can support higher percentages of legumes. Adjustments are made in the price to reflect a quality differential among soil groups. The published "alfalfa hay baled" price is used as a basis with adjustments made for the protein and energy content of the hay. Corn grain and soybean meal prices are used as a basis for the value of protein and energy to scale the hay crop price for changes in quality. Consequently, the price per ton is different for each of the soil groups except Soil Groups 2 and 3 which both have 75 percent legume.

TABLE 4.

HAY PRICES ADJUSTED FOR QUALITY DIFFERENTIALS
BY SOIL GROUP

Soil Group	Percent Legume	Crude Protein	Net Energy	Price ¹	
				1982	1978-1982
	Percent of Dry Matter		Mcal/lb. of Dry Matter	--Dollars Per Ton--	
1	80	16.50	.574	85.20	69.48
2 & 3	75	16.10	.568	83.50	68.14
4	70	15.75	.562	81.97	66.94
5	60	15.00	.550	78.75	64.40
6	40	13.50	.526	72.30	59.32
7	30	12.75	.514	69.08	56.79
8	20	12.00	.502	65.86	54.25

¹Harvest time price of \$78.75 per ton for alfalfa hay for crop year 1981 and \$64.40 per ton for 1978-1982 crop years. Prices were adjusted for crop quality based on percentage legume. Alfalfa hay price was specified to be 60 percent legume. Adjustments for quality were accomplished using corn grain and soybean meal prices as indicators of energy and protein values to scale the hay price based on quality.

Value of Production

The value of production or the total revenue from an acre of corn or hay crop is the yield per acre multiplied by the price per unit of corn or hay. The five-year average value of production for Soil Group 1 is \$297.51 for corn and \$264.01 for hay. These values were obtained by multiplying 18.4 tons per acre by \$16.17 per ton for corn value of production and 3.8 tons per acre by \$64.48 per ton for hay value of production.

Growing Expenses

Input levels and consequent variable expenses depend on two factors. The first is the yield just discussed; the second is crop rotation. In Soil Group 1, a rotation of seven years of corn followed by three years of hay is followed. Inputs are based on recommendations made by Cornell agronomists.

Seed expense per acre was calculated using the specified seeding rates per acre and corresponding seed prices per unit (Tables 5 and 6). For corn, the seeding rate for all soil groups is 25,000 kernels planted per acre. Seeding costs for hay are establishment year cost divided by the years of life of the stand. On the first four soil groups, an alfalfa-timothy mixture is seeded while on Soil Groups 5 through 8 a birdsfoot trefoil-timothy mixture is used. Cost per acre is determined by multiplying the seeding rates by the prices and dividing by the number of years of life of the stand.

TABLE 5.
SEEDING RATES FOR CORN AND HAY

Crop	Soil Group	Rate
Corn	1 - 7	25,000 Kernels Planted Per Acre
Hay		
Alfalfa-Timothy	1 - 4	12# Alfalfa and 5# Timothy
Birdsfoot Trefoil-Timothy	5 - 8	8# Birdsfoot Trefoil and 4# Timothy

TABLE 6.

SEED, FERTILIZER AND LIME, AND CHEMICAL COSTS, 1978-82

Item	Cost				
	1978	1979	1980	1981	1982
<u>Seed</u>					
Corn, per 80,000 kernels	\$39.00	\$39.50	\$49.00	\$55.00	\$65.00
Alfalfa, lb.	2.19	2.52	2.65	2.70	2.56
Birdsfoot trefoil, lb.	4.15	4.65	4.65	4.65	3.75
Timothy, lb.	0.70	1.35	0.80	0.80	0.85
<u>Fertilizer & Lime</u>					
Nitrogen, lb.	0.18	0.23	0.28	0.32	0.32
Phosphorus, lb.	0.19	0.22	0.28	0.28	0.28
Potassium, lb.	0.10	0.13	0.14	0.16	0.16
Lime, ton, spread	17.80	20.40	22.80	22.50	23.80
<u>Chemicals</u>					
Premerge, gal.	9.15	11.45	10.50	10.80	11.30
Methoxychlor, gal.	9.75	10.15	10.60	9.50	14.00
Atrazine, gal.	12.50	11.50	10.60	13.65	12.35
Crop oil, gal.	7.50	7.20	8.20	8.90	8.75
Sutan + 6.7E, gal.	22.50	19.30	20.35	26.60	30.25
Furadan, lb.	0.88	0.92	0.90	1.05	0.88
Captan/Diazanone, lb.	3.38	2.90	3.75	4.00	4.10

Fertilizer prices (Table 6) are multiplied by the quantities applied (Table 7) to determine fertilizer cost per acre. For corn, the calculation was straightforward, the number of pounds of nitrogen, potassium, and phosphorus multiplied by the respective nutrient price. For hay, total cost of fertilizer for the years in the rotation must be determined and then divided by number of years of life of the stand to obtain average cost per acre. As an example, for Soil Group 1 in the first year, 60 pounds each of phosphorus and potassium are applied while in the second and third years 40

pounds of phosphorus and 160 pounds of potassium are applied. For example, cost per acre for phosphorus would be $60 + 40 + 40 = 140$ divided by 3 years equals 46.67 pounds multiplied by the per pound price of phosphorus. Lime is included as one-half ton per year multiplied by the price of lime (Table 6). Lime is not required on high-lime soils.

TABLE 7.

FERTILIZATION RATES FOR CORN AND HAY
BY SOIL GROUP

Soil Group	Rotation	Corn	Hay ¹
		N-P ₂ O ₅ -K ₂ O	N-P ₂ O ₅ -K ₂ O
1	C ₇ H ₃	90-60-60	0-40-160
2	C ₆ H ₄	85-60-60	0-40-160
3	C ₅ H ₅	75-60-60	0-40-120
4	C ₅ H ₅	75-60-60	0-40-120
5	C ₄ H ₆	60-60-60	0-30-60
6	C ₃ H ₇	50-60-60	0-30-60 ²
7	C ₂ H ₈	30-60-60	0-30-60 ²
8	C ₀ H ₁₀	— — —	30-30-30

¹Establishment year fertilization is 0-60-60.

²Years 7 and 8 fertilization is 30-30-30.

Chemical cost was obtained utilizing the chemical application program (Table 8) multiplied by the associated prices (Table 6). The average chemical cost per year was determined by first calculating the total cost for the years of life of the stand of hay or for the years corn is grown in the rotation. Total cost was then divided by number of years of hay or corn in the rotation. For hay on a Group 1 soil, the chemical program is Premerge in the establishment year and Methoxychlor each year. The cost of these four chemical applications was summed and divided by three. For corn, the

cost of the chemical program for years one, two, and three through seven was summed and divided by years of corn in the rotation to attain the average annual cost per acre.

TABLE 8.

CHEMICAL APPLICATIONS FOR CORN AND HAY

Crop	Soil Group(s)	Year(s)	Chemical(s)	Rate Per Acre
Hay	1-8	1	Premerge	1-1/3 qt. at seeding
	1-4	All	Methoxychlor	1 qt. per year
Corn ¹	1	1	Atrazine	2# preplant and 2# with 1 qt. oil post emergence
		2	Atrazine	2# with 1 qt. oil post emergence
		3-7	Sutan +6.7E	4-3/4 pt. with 1# Atrazine preplant & double incorporate
			Furadan	10 pounds
			Same as Group 1, less years in 3-7	
	2-5		Same as Group 1	
	6	1&2	Same as Group 1	
		3	Atrazine & Sutan +6.7E	1# Atrazine & 4-3/4 pt. Sutan +6.7E pre-plant incorporated
			Furadan	10 pounds
	7	1	Same as Group 1	
		2	Sutan +6.7E	6 pt. preplant & double incorporate

¹Planter box treatment 2 ounces of Captan/Diazanone per seed unit all years, all soil groups.

Power and equipment costs were calculated using engineering formulas to determine the time for each machine to cover an acre based on width, speed, field efficiency, and number of trips the machine travels over the field per year. The specific costs of fuel, oil, and grease were calculated from

coefficients derived from University of Nebraska tractor test data. Repair and maintenance costs were calculated from a formula developed by the American Society of Agricultural Engineers. Power and equipment costs were calculated for 1982 prices and adjusted using cost index factors for 1978-82. "Other" costs were derived from Cost Account data for 1982 and adjusted by a cost index of prices paid by farmers for items used in production for 1978-82.

Fuel, oil, and grease and repairs and maintenance were increased by five percent in Soil Groups 5 and 6 and by ten percent in Soil Groups 7 and 8 to reflect the increased costs of machinery operation on steeper slopes and on more poorly drained soils. This total cost was calculated and then divided by the years of life of the stand.

Harvesting Expenses

Harvesting expenses were calculated in a similar manner to power and equipment expenses for growing. Fuel, oil, and grease and repairs and maintenance were again calculated. For harvesting, however, cost was dependent upon number of cuttings and quantities harvested. Again, all these costs were increased as indicated above to reflect slope or drainage considerations. Three cuttings were specified for Soil Groups 1-3, two cuttings for Soil Groups 4 and 5, and one cutting for Soil Groups 6 and 7.

Labor Requirements

The charge for operator labor and management, family labor, and any hired labor is included in two parts. The first is a management charge to compensate the operator or operators of the farm for their management input. This charge is five percent of the total value of production. The second part is for the hours of labor required in the production and harvesting of the crop.

Labor requirements for corn and hay are based on studies of labor disappearance on farms. Hours of labor required varies by soil group and for hay the number of cuttings (Table 9).

TABLE 9.
LABOR REQUIREMENTS FOR CORN AND HAY
BY SOIL GROUP

Soil Group	Corn	Hay ¹
	hours/acre	hours/acre
1	6.2	7.7
2	6.1	7.5
3	6.0	7.2
4	5.9	5.5
5	5.8	5.3
6	5.7	4.1
7	5.6	3.5
8	---	1.0 ²

¹Soil Groups 1-3, three cuttings per year; 4 and 5, two cuttings per year; and 6 and 7, one cutting per year.

²Pasture.

Other Variable Costs

The remaining variable costs are the charge for operator and family labor, custom fertilizer application, interest on operating capital, fuel and twine costs, and property tax rates (Table 10). Labor charge includes cash wages plus social security, workmen's compensation, and other benefits. The interest on operating capital is a charge for the capital required to purchase inputs for growing the crop. The rate derived represents an average of six months from planting until harvest and was charged at the short-term interest rate of Production Credit Associations in the Springfield District. The property tax rate of two percent of market value is used to calculate a property tax payment which is deducted from net returns before capitalizing.

TABLE 10.

MISCELLANEOUS ITEMS

Item	Cost				
	1978	1979	1980	1981	1982
Labor, per hour	\$ 3.90	\$ 4.25	\$ 4.60	\$ 4.95	\$ 5.10
Custom Fertilizer Application Side Dress Nitrogen on Corn, Acre	3.25	4.25	5.00	5.25	5.00
Interest on Operating Capital, Percent	9.12	11.28	13.03	15.45	14.94
Diesel Fuel, Gallons	--	--	--	--	1.24
Gasoline, Gallons	--	--	--	--	1.25
Twine, bale	13.30	15.60	24.60	23.60	24.00
Property Tax Rate, Percent of Market Value	--	--	--	--	2.00

Fuel, oil, and grease repairs and maintenance are increased for Soil Groups 5 and 6 by five percent and 7 and 8 by 10 percent to account for increased cost of machinery operation on steeper slopes and wetter soils.

Fixed Expenses

An important expense for any crop production enterprise is the machinery complement required to plant and harvest the crop. Machinery depreciation, interest and insurance are fixed costs since they don't vary significantly with utilization. The procedure used to determine the fixed costs for corn and hay is outlined below.

Upon examination of the rotations on the eight soil groups, an average farm was calculated to have 150 acres of hay, 120 acres of corn, and 30 acres of pasture for a total of 300 crop acres. Machinery complement specification and allocation of the different items of machinery to the corn silage, hay, and pasture enterprises is the first step in the calculation procedure (Table 11). Proportion of the time the machinery was used on each enterprise was used to calculate the total and the per acre costs (1982 new

cost) for each of the three enterprises. Harvesting machinery use varies across soil groups with differences in number of cuttings and quantities harvested. This causes differences in proportions of machinery use time depending on the soil groups making up the average rotation. The proportions shown in Table 11 are based on quantities harvested for soil group 5. Differences in fixed expenses per acre across soil groups result from this difference in machinery use.

Fixed cost per year was calculated using 1982 new investment cost for each crop. Cost indexes (Table 12) were used to calculate the average investment cost of the machinery complement on the farm for the 1982 crop year and the average of the 1978 through 1982 crop years. This index is based on a machinery complement purchased evenly over the preceding nine years. The 1982 index was multiplied by the 1982 new investment cost to obtain the average investment cost for the 1982 crop year. The 1978 through 1982 index was used for converting the 1982 new machinery complement investment back to a 1978 through 1982 average.

TABLE 11.

INVESTMENT IN POWER AND EQUIPMENT COMPLEMENT FOR CORN SILAGE,
HAY, AND PASTURE PRODUCTION ON 300 ACRES, ALLOCATED TO ENTERPRISES,
1982 NEW COST

Item	1982 Cost
Tractor, 2-wheel drive, 90 hp.	\$28,800
Tractor, 2-wheel drive, 50 hp.	15,500
Tractor, 2-wheel drive, 35 hp.	12,300
Plow, semi-mounted, 4-16" bottoms	5,670
Disc harrow, 12'	4,700
Springtooth harrow, 16'	2,200
Cultipacker, 12'	1,800
Corn planter, 4-row	8,000
Cultivator, 4-row	2,550
Sprayer, trailer w/tank	2,950
Cultipacker seeder 10'	3,350
Fertilizer spreader, 12'	1,800
Mower-conditioner, windrower, 9'	7,800
Side delivery rake	2,250
Baler with bale thrower	9,200
Bale wagons, 3@ \$2,150	6,450
Forage harvester with 2-row crop head	14,200
Forage wagons, 2@ \$6,425	12,850
Forage blower	2,900
Pickup truck, 1/2 ton	7,560

TABLE 12.

INDEX FACTORS TO CONVERT 1982 INVESTMENT COSTS
TO CROP YEARS 1982 AND 1978-1982 AVERAGE
AND 1982 PRODUCTION COSTS TO 1978-1982 CROP YEAR AVERAGE

Item	Index Factor	
	1982	1978-1982
Investments		
Power and Equipment	0.69	0.56
Building and Fencing Materials	0.60	0.52
Production Costs		
Diesel Fuel and Gasoline	---	0.81
Items Used for Production	---	0.84
Power and Equipment Repairs	---	0.83
Building and Fencing Materials	---	0.88

Annual fixed cost includes depreciation, interest, and insurance.

Depreciation is the annual charge for the use of the machinery, calculated using straight-line depreciation over the nine-year life with a ten percent salvage value. Interest on investment represents the cost of borrowed funds or the fact that if the farmer had not invested equity capital in machinery, a return from alternative investments could have been obtained. The interest rate used is the same as for operating capital (Table 10).

Machinery and corn silage storage and electric fencing investments were required to complete the economic profiles (Table 13). The first item was the cost of machinery storage to house the equipment complement and was charged on a per acre basis to each of the three enterprises. Depreciation, interest, insurance and repairs was charged on building costs averaged over a 15-year period. The fixed cost of the electric fencing was used only in the pasture enterprise (Soil Group 8) and the cost reflected accordingly. The fixed cost information on the corn silage storage was used as previously described for calculating the adjusted price of corn silage.

TABLE 13.

INVESTMENT AND ANNUAL FIXED COSTS OF MACHINERY STORAGE,
CORN SILAGE STORAGE, AND ELECTRIC FENCING

	1982 New Cost	1982 Crop Year ¹
MACHINERY STORAGE		
Pole barn; three exterior walls, metal roofing, dirt floor	\$17,400	\$10,440
CORN SILAGE STORAGE		
Concrete stave silo; including site preparation and roof, 24' x 70'	\$24,000	\$14,400
ELECTRIC FENCING		
Electric fencer, wire, posts, post insulators and handles	\$ 650	\$ 390

¹Index factor of 0.60 for 1982 and 0.52 for 1978-1982 average to convert 1982 new cost to crop year(s) average.

Return to Land

Total Expenses are calculated by adding Total Growing, Total Harvesting, Interest on Operating Capital, Management Charge, Labor, and Total Fixed Expenses (less property tax). This total is subtracted from the Value of Production to obtain the Return to Land (less property tax).

The Return to Land before property tax for corn and hay for the 1978 through 1982 crop years was weighted by the rotation (Table 7) to obtain a rotation weighted average return to land. Based upon the weighted average return to land and the capitalization rate, a property tax charge (Table 13) was deducted to produce Return to Land. Return to Land is the amount to be capitalized into land value.

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ECONOMIC PROFILES

SOIL GROUPS 1-8

SOIL GROUP 1 9/22/83
7 CORN - 3 HAY
High Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	18.40	18.40	3.80	3.80
Price (\$/ton)	15.87	16.17	85.20	69.48
Value of Production	292.00	297.51	323.75	264.01
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	11.66	11.60
Fertilizer				
Nitrogen	28.80	23.94	.00	.00
Phosphorus	16.80	15.00	13.16	11.75
Potassium	9.60	8.28	20.32	17.53
Custom application	5.00	4.55	.00	.00
Lime	.00	.00	.00	.00
Chemicals	25.09	22.50	4.75	3.88
Power, equip				
Fuel, oil	7.98	6.46	3.54	2.86
Repair, main.	4.73	3.93	2.24	1.86
Other	1.75	1.57	2.00	1.79
Total Growing	120.07	101.70	57.67	51.27
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	11.37	9.20	12.77	10.34
Repair, main.	7.24	6.01	9.14	7.59
Twine			6.81	5.74
Other	4.60	4.12	3.30	2.96
Total Harvesting	23.21	19.34	32.03	26.63
Interest on Operating Capital	10.70	7.72	6.70	4.97
Management Charge	14.60	14.88	16.19	13.20
Labor	31.62	28.27	39.27	35.11
TOTAL VARIABLE	200.20	171.90	151.85	131.18
FIXED EXPENSES				
Power, equip.	96.76	73.76	64.21	48.95
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	103.22	79.33	70.67	54.52
(less property tax)				
TOTAL EXPENSES	303.41	251.23	222.52	185.70
RETURN TO LAND	-11.41	46.28	101.23	78.31
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN				
TO LAND, 1978-1982 Average		55.89		
Property Tax		8.79		
RETURN TO LAND		47.09		

SOIL GROUP 1 9/22/83
7 CORN - 3 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	18.40	18.40	3.80	3.80
Price (\$/ton)	15.87	16.17	85.20	69.48
Value of Production	292.00	297.51	323.75	264.01
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	11.66	11.60
Fertilizer				
Nitrogen	28.80	23.94	.00	.00
Phosphorus	16.80	15.00	13.16	11.75
Potassium	9.60	8.28	20.32	17.53
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	25.09	22.50	4.75	3.88
Power, equip				
Fuel, oil	7.98	6.46	3.54	2.86
Repair, main.	4.73	3.93	2.24	1.86
Other	1.75	1.57	2.00	1.79
Total Growing	131.97	112.43	69.57	62.00
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	11.37	9.20	12.77	10.34
Repair, main.	7.24	6.01	9.14	7.59
Twine			6.81	5.74
Other	4.60	4.12	3.30	2.96
Total Harvesting	23.21	19.34	32.03	26.63
Interest on Operating Capital	11.59	8.41	7.59	5.66
Management Charge	14.60	14.88	16.19	13.20
Labor	31.62	28.27	39.27	35.11
TOTAL VARIABLE	212.99	183.32	164.64	142.59
FIXED EXPENSES				
Power, equip.	96.76	73.76	64.21	48.95
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED (less property tax)	103.22	79.33	70.67	54.52
TOTAL EXPENSES	316.20	262.65	235.31	197.11
RETURN TO LAND (less property tax)	-24.20	34.86	88.44	66.89
ROTATION WEIGHTED AVERAGE RETURN TO LAND, 1978-1982 Average		44.47		
Property Tax		7.00		
RETURN TO LAND		37.47		

SOIL GROUP 2 9/22/83
6 CORN - 4 HAY
High Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	17.40	17.40	3.60	3.60
Price (\$/ton)	15.87	16.17	83.50	68.14
Value of Production	276.13	281.34	300.59	245.30
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	8.74	8.70
Fertilizer				
Nitrogen	27.20	22.61	.00	.00
Phosphorus	16.80	15.00	12.60	11.25
Potassium	9.60	8.28	21.60	18.63
Custom application	5.00	4.55	.00	.00
Lime	.00	.00	.00	.00
Chemicals	24.22	21.77	4.44	3.58
Power, equip				
Fuel, oil	7.98	6.46	3.04	2.46
Repair, main.	4.71	3.91	1.99	1.65
Other	1.75	1.57	2.00	1.79
Total Growing	117.57	99.62	54.42	48.07
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	10.79	8.74	12.47	10.09
Repair, main.	6.76	5.61	8.88	7.37
Twine			6.46	5.44
Other	4.60	4.12	3.30	2.96
Total Harvesting	22.15	18.47	31.10	25.86
Interest on Operating Capital	10.44	7.54	6.39	4.72
Management Charge	13.81	14.07	15.03	12.27
Labor	31.11	27.82	38.25	34.20
TOTAL VARIABLE	195.07	167.51	145.19	125.12
FIXED EXPENSES				
Power, equip.	96.61	73.65	61.22	46.67
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	103.07	79.22	67.68	52.24
(less property tax)				
TOTAL EXPENSES	298.15	246.73	212.86	177.35
RETURN TO LAND	-22.01	34.61	87.72	67.95
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN TO LAND, 1978-1982 Average		47.95		
Property Tax		7.54		
RETURN TO LAND		40.40		

SOIL GROUP 2 9/22/83
6 CORN - 4 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	17.40	17.40	3.60	3.60
Price (\$/ton)	15.87	16.17	83.50	68.14
Value of Production	276.13	281.34	300.59	245.30
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	8.74	8.70
Fertilizer				
Nitrogen	27.20	22.61	.00	.00
Phosphorus	16.80	15.00	12.60	11.25
Potassium	9.60	8.28	21.60	18.63
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	24.22	21.77	4.44	3.58
Power, equip				
Fuel, oil	7.98	6.46	3.04	2.46
Repair, main.	4.71	3.91	1.99	1.65
Other	1.75	1.57	2.00	1.79
Total Growing	129.47	110.35	66.32	58.80
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	10.79	8.74	12.47	10.09
Repair, main.	6.76	5.61	8.88	7.37
Twine			6.46	5.44
Other	4.60	4.12	3.30	2.96
Total Harvesting	22.15	18.47	31.10	25.86
Interest on Operating Capital	11.33	8.22	7.28	5.40
Management Charge	13.81	14.07	15.03	12.27
Labor	31.11	27.82	38.25	34.20
TOTAL VARIABLE	207.86	178.93	157.98	136.53
FIXED EXPENSES				
Power, equip.	96.61	73.65	61.22	46.67
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	103.07	79.22	67.68	52.24
(less property tax)				
TOTAL EXPENSES	310.93	258.14	225.65	188.77
RETURN TO LAND	-34.80	23.20	74.93	56.53
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN TO LAND, 1978-1982 Average		36.53		
Property Tax		5.75		
RETURN TO LAND		30.78		

SOIL GROUP 3 9/22/83
5 CORN - 5 HAY
High Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	16.10	16.10	3.30	3.30
Price (\$/ton)	15.87	16.17	83.50	68.14
Value of Production	255.50	260.32	275.54	224.86
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	6.99	6.96
Fertilizer				
Nitrogen	24.00	19.95	.00	.00
Phosphorus	16.80	15.00	12.32	11.00
Potassium	9.60	8.28	17.28	14.90
Custom application	5.00	4.55	.00	.00
Lime	.00	.00	.00	.00
Chemicals	22.99	20.75	4.25	3.41
Power, equip				
Fuel, oil	7.98	6.46	2.75	2.22
Repair, main.	4.68	3.88	1.84	1.53
Other	1.75	1.57	2.00	1.79
Total Growing	113.11	95.91	47.43	41.81
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	10.05	8.13	12.04	9.74
Repair, main.	6.14	5.10	8.51	7.06
Twine			5.72	4.98
Other	4.60	4.12	3.30	2.96
Total Harvesting	20.79	17.36	29.76	24.75
Interest on Operating Capital	10.00	7.23	5.77	4.25
Management Charge	12.78	13.02	13.78	11.24
Labor	30.60	27.36	36.72	32.83
TOTAL VARIABLE	187.28	160.88	133.46	114.89
FIXED EXPENSES				
Power, equip.	96.44	73.52	59.45	45.32
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	102.90	79.09	65.91	50.89
(less property tax)				
TOTAL EXPENSES	290.18	239.97	199.36	165.78
RETURN TO LAND	-34.68	20.35	76.17	59.08
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN		39.72		
TO LAND, 1978-1982 Average				
Property Tax		6.25		
RETURN TO LAND		33.47		

SOIL GROUP 3 9/22/83
5 CORN - 5 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	16.10	16.10	3.30	3.30
Price (\$/ton)	15.87	16.17	83.50	68.14
Value of Production	255.50	260.32	275.54	224.86
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	6.99	6.96
Fertilizer				
Nitrogen	24.00	19.95	.00	.00
Phosphorus	16.80	15.00	12.32	11.00
Potassium	9.60	8.28	17.28	14.90
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	22.99	20.75	4.25	3.41
Power, equip				
Fuel, oil	7.98	6.46	2.75	2.22
Repair, main.	4.68	3.88	1.84	1.53
Other	1.75	1.57	2.00	1.79
Total Growing	125.01	106.64	59.33	52.54
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	10.05	8.13	12.04	9.74
Repair, main.	6.14	5.10	8.51	7.06
Twine			5.92	4.98
Other	4.60	4.12	3.30	2.96
Total Harvesting	20.79	17.36	29.76	24.75
Interest on Operating Capital	10.89	7.91	6.66	4.93
Management Charge	12.78	13.02	13.78	11.24
Labor	30.60	27.36	36.72	32.83
TOTAL VARIABLE	200.07	172.29	146.24	126.30
FIXED EXPENSES				
Power, equip.	96.44	73.52	59.45	45.32
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	102.90	79.09	65.91	50.89
(less property tax)				
TOTAL EXPENSES	302.97	251.38	212.15	177.19
RETURN TO LAND	-47.47	8.94	63.38	47.67
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN		28.30		
TO LAND, 1978-1982 Average				
Property Tax		4.45		
RETURN TO LAND		23.85		

SOIL GROUP 4 9/22/83
5 CORN - 5 HAY
High Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	14.40	14.40	2.90	2.90
Price (\$/ton)	15.87	16.17	81.97	66.94
Value of Production	228.53	232.83	237.72	194.12
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	6.99	6.96
Fertilizer				
Nitrogen	24.00	19.95	.00	.00
Phosphorus	16.80	15.00	12.32	11.00
Potassium	9.60	8.28	17.28	14.90
Custom application	5.00	4.55	.00	.00
Lime	.00	.00	.00	.00
Chemicals	22.99	20.75	4.25	3.41
Power, equip				
Fuel, oil	7.98	6.46	2.75	2.22
Repair, main.	4.54	3.77	1.79	1.49
Other	1.75	1.57	2.00	1.79
Total Growing	112.98	95.80	47.39	41.77
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	9.08	7.35	9.27	7.51
Repair, main.	5.30	4.40	5.87	4.87
Twine			5.20	4.38
Other	4.60	4.12	3.30	2.96
Total Harvesting	18.97	15.87	23.65	19.72
Interest on Operating Capital	9.86	7.13	5.31	3.92
Management Charge	11.43	11.64	11.89	9.71
Labor	30.09	26.90	28.05	25.08
TOTAL VARIABLE	183.32	157.34	116.27	100.21
FIXED EXPENSES				
Power, equip.	98.61	75.17	57.61	43.92
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	105.07	80.74	64.07	49.49
(less property tax)				
TOTAL EXPENSES	288.39	238.08	180.35	149.70
RETURN TO LAND	-59.87	-5.25	57.38	44.42
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN		19.59		
TO LAND, 1978-1982 Average				
Property Tax		3.08		
RETURN TO LAND		16.50		

SOIL GROUP 4 9/22/83
5 CORN - 5 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	14.40	14.40	2.90	2.90
Price (\$/ton)	15.87	16.17	81.97	66.94
Value of Production	228.53	232.83	237.72	194.12
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	6.99	6.96
Fertilizer				
Nitrogen	24.00	19.95	.00	.00
Phosphorus	16.80	15.00	12.32	11.00
Potassium	9.60	8.28	17.28	14.90
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	22.99	20.75	4.25	3.41
Power, equip				
Fuel, oil	7.98	6.46	2.75	2.22
Repair, main.	4.54	3.77	1.79	1.49
Other	1.75	1.57	2.00	1.79
Total Growing	124.88	106.53	59.29	52.50
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	9.08	7.35	9.27	7.51
Repair, main.	5.30	4.40	5.87	4.87
Twine			5.20	4.38
Other	4.60	4.12	3.30	2.96
Total Harvesting	18.97	15.87	23.65	19.72
Interest on Operating Capital	10.75	7.81	6.20	4.61
Management Charge	11.43	11.64	11.89	9.71
Labor	30.09	26.90	28.05	25.08
TOTAL VARIABLE	196.11	168.75	129.06	111.62
FIXED EXPENSES				
Power, equip.	98.61	75.17	57.61	43.92
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	105.07	80.74	64.07	49.49
(less property tax)				
TOTAL EXPENSES	301.18	249.50	193.14	161.11
RETURN TO LAND	-72.65	-16.66	44.59	33.01
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN		8.17		
TO LAND, 1978-1982 Average				
Property Tax		1.29		
RETURN TO LAND		6.89		

SOIL GROUP 5 9/22/83
4 CORN - 6 HAY
High Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	13.30	13.30	2.70	2.70
Price (\$/ton)	15.87	16.17	78.75	64.40
Value of Production	211.07	215.05	212.63	173.88
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	5.57	6.43
Fertilizer				
Nitrogen	19.20	15.96	.00	.00
Phosphorus	16.80	15.00	9.80	8.75
Potassium	9.60	8.28	9.60	8.28
Custom application	5.00	4.55	.00	.00
Lime	.00	.00	.00	.00
Chemicals	21.15	19.22	.61	.58
Power, equip				
Fuel, oil	8.38	6.79	2.68	2.17
Repair, main.	4.74	3.94	1.78	1.48
Other	1.75	1.57	2.00	1.79
Total Growing	106.94	90.77	32.03	29.47
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	8.87	7.18	9.44	7.64
Repair, main.	5.06	4.20	5.93	4.92
Twine			4.84	4.08
Other	4.60	4.12	3.30	2.96
Total Harvesting	18.53	15.50	23.51	19.60
Interest on Operating Capital	9.37	6.78	4.15	3.13
Management Charge	10.55	10.75	10.63	8.69
Labor	29.58	26.45	27.03	24.17
TOTAL VARIABLE	174.97	150.26	97.35	85.06
FIXED EXPENSES				
Power, equip.	98.41	75.02	56.40	43.00
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	104.87	80.59	62.86	48.57
(less property tax)				
TOTAL EXPENSES	279.84	230.84	160.21	133.63
RETURN TO LAND	-68.77	-15.80	52.41	40.25
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN TO LAND, 1978-1982 Average		17.83		
Property Tax		2.81		
RETURN TO LAND		15.03		

SOIL GROUP 5 9/22/83
4 CORN - 6 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	13.30	13.30	2.70	2.70
Price (\$/ton)	15.87	16.17	78.75	64.40
Value of Production	211.07	215.05	212.63	173.68
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	5.57	6.43
Fertilizer				
Nitrogen	19.20	15.96	.00	.00
Phosphorus	16.80	15.00	9.80	8.75
Potassium	9.60	8.28	9.60	8.28
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	21.15	19.22	.61	.58
Power, equip				
Fuel, oil	8.38	6.79	2.68	2.17
Repair, main.	4.74	3.94	1.78	1.48
Other	1.75	1.57	2.00	1.79
Total Growing	118.84	101.50	43.93	40.20
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	8.87	7.18	9.44	7.64
Repair, main.	5.06	4.20	5.93	4.92
Twine			4.84	4.08
Other	4.60	4.12	3.30	2.96
Total Harvesting	18.53	15.50	23.51	19.60
Interest on Operating Capital	10.26	7.47	5.04	3.82
Management Charge	10.55	10.75	10.63	8.69
Labor	29.58	26.45	27.03	24.17
TOTAL VARIABLE	187.76	161.67	110.14	96.48
FIXED EXPENSES				
Power, equip.	98.41	75.02	56.40	43.00
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	104.87	80.59	62.86	48.57
(less property tax)				
TOTAL EXPENSES	292.63	242.26	173.00	145.04
RETURN TO LAND	-81.56	-27.21	39.63	28.84
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN		6.42		
TO LAND, 1978-1982 Average				
Property Tax		1.01		
RETURN TO LAND		5.41		

SOIL GROUP 6 9/22/83
3 CORN - 7 HAY
High Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	11.30	11.30	2.20	2.20
Price (\$/ton)	15.87	16.17	72.30	59.32
Value of Production	179.33	182.71	159.07	130.51
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	4.77	5.51
Fertilizer				
Nitrogen	16.00	13.30	1.38	1.14
Phosphorus	16.80	15.00	9.52	8.50
Potassium	9.60	8.28	8.96	7.73
Custom application	5.00	4.55	.00	.00
Lime	.00	.00	.00	.00
Chemicals	18.09	16.67	.54	.51
Power, equip				
Fuel, oil	8.38	6.79	2.53	2.05
Repair, main.	4.56	3.79	1.66	1.38
Other	1.75	1.57	2.00	1.79
Total Growing	100.50	85.41	31.35	28.60
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	7.67	6.21	6.27	5.07
Repair, main.	4.11	3.41	3.42	2.84
Twine			3.95	3.32
Other	4.60	4.12	3.30	2.96
Total Harvesting	16.38	13.74	16.94	14.20
Interest on Operating Capital	8.73	6.33	3.61	2.73
Management Charge	8.97	9.14	7.95	6.53
Labor	29.07	25.99	20.91	18.70
TOTAL VARIABLE	163.64	140.61	80.75	70.75
FIXED EXPENSES				
Power, equip.	101.90	77.68	52.29	39.86
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED (less property tax)	108.36	83.25	58.75	45.43
TOTAL EXPENSES	272.00	223.87	139.50	116.18
RETURN TO LAND (less property tax)	-92.68	-41.16	19.56	14.33
ROTATION WEIGHTED AVERAGE RETURN TO LAND, 1978-1982 Average		-2.31		
Property Tax		.00		
RETURN TO LAND		-2.31		

SOIL GROUP 6 9/22/83
3 CORN - 7 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	11.30	11.30	2.20	2.20
Price (\$/ton)	15.87	16.17	72.30	59.32
Value of Production	179.33	182.71	159.07	130.51
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	4.77	5.51
Fertilizer				
Nitrogen	16.00	13.30	1.38	1.14
Phosphorus	16.80	15.00	9.52	8.50
Potassium	9.60	8.28	8.96	7.73
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	18.09	16.67	.54	.51
Power, equip				
Fuel, oil	8.38	6.79	2.53	2.05
Repair, main.	4.56	3.79	1.66	1.38
Other	1.75	1.57	2.00	1.79
Total Growing	112.40	96.14	43.25	39.33
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	7.67	6.21	6.27	5.07
Repair, main.	4.11	3.41	3.42	2.84
Twine			3.95	3.32
Other	4.60	4.12	3.30	2.96
Total Harvesting	16.38	13.74	16.94	14.20
Interest on Operating Capital	9.62	7.01	4.50	3.42
Management Charge	8.97	9.14	7.95	6.53
Labor	29.07	25.99	20.91	18.70
TOTAL VARIABLE	176.43	152.03	93.54	82.17
FIXED EXPENSES				
Power, equip.	101.90	77.68	52.29	39.86
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	108.36	83.25	58.75	45.43
(less property tax)				
TOTAL EXPENSES	284.79	235.28	152.29	127.60
RETURN TO LAND	-105.46	-52.57	6.77	2.92
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN			-13.73	
TO LAND, 1978-1982 Average				
Property Tax			.00	
RETURN TO LAND			-13.73	

SOIL GROUP 7 9/22/83
2 CORN - 8 HAY
Low Lime

	CORN		HAY	
	1982	1978-82	1982	1978-82
Yield (tons/acre)	9.70	9.70	1.60	1.60
Price (\$/ton)	15.87	16.17	69.08	56.79
Value of Production	153.94	156.84	110.53	90.86
VARIABLE EXPENSES				
Growing				
Seed	20.31	15.47	4.18	4.82
Fertilizer				
Nitrogen	9.60	7.98	2.40	2.00
Phosphorus	16.80	15.00	9.52	8.50
Potassium	9.60	8.28	8.32	7.18
Custom application	5.00	4.55	.00	.00
Lime	11.90	10.73	11.90	10.73
Chemicals	18.60	16.00	.47	.44
Power, equip				
Fuel, oil	8.78	7.11	2.53	2.05
Repair, main.	4.71	3.91	1.67	1.39
Other	1.75	1.57	2.00	1.79
Total Growing	107.06	90.60	42.99	38.89
Harvesting				
Power & Equipment				
Fuel, Oil & Grease	7.02	5.69	5.62	4.55
Repair, main.	3.62	3.00	2.99	2.48
Twine			2.87	2.42
Other	4.60	4.12	3.30	2.96
Total Harvesting	15.24	12.81	14.77	12.40
Interest on Operating Capital	9.14	6.60	4.31	3.27
Management Charge	7.70	7.84	5.53	4.54
Labor	28.56	25.54	17.85	15.96
TOTAL VARIABLE	167.69	143.39	85.45	75.07
FIXED EXPENSES				
Power, equip.	102.40	78.06	50.90	38.80
Mach. storage	6.46	5.57	6.46	5.57
TOTAL FIXED	108.86	83.63	57.36	44.37
(less property tax)				
TOTAL EXPENSES	276.55	227.02	142.81	119.44
RETURN TO LAND	-122.61	-70.18	-32.28	-28.58
(less property tax)				
ROTATION WEIGHTED AVERAGE RETURN		-36.90		
TO LAND, 1978-1982 Average				
Property Tax		.00		
RETURN TO LAND		-36.90		

SOIL GROUP 8 9/22/83
PASTURE
Low Lime

	PASTURE	
	1982	1978-82
Yield (tons/acre)	1.00	1.00
Price (\$/ton)	65.86	54.25
Value of Production	65.86	54.25
VARIABLE EXPENSES		
Growing		
Seed	3.34	3.86
Fertilizer		
Nitrogen	9.60	7.98
Phosphorus	8.40	7.50
Potassium	4.80	4.14
Custom application	.00	.00
Lime	11.90	10.73
Chemicals	.38	.35
Power, equip		
Fuel, oil	3.07	2.48
Repair, main.	2.04	1.69
Other	1.00	.90
Total Growing	44.53	39.64
Harvesting		
Power & Equipment		
Fuel, Oil & Grease	.00	.00
Repair, main.	.00	.00
Twine	.00	.00
Other	.00	.00
Total Harvesting	.00	.00
Interest on Operating Capital	3.33	2.53
Management Charge	3.29	2.71
Labor	5.10	4.56
TOTAL VARIABLE	56.24	49.44
FIXED EXPENSES		
Power, equip.	1.53	1.17
Mach. storage	6.46	5.57
Fence	1.93	1.62
TOTAL FIXED	9.92	8.36
(less property tax)		
TOTAL EXPENSES	66.17	57.79
RETURN TO LAND	-.31	-3.54
(less property tax)		
ROTATION WEIGHTED AVERAGE RETURN TO LAND, 1978-1982 Average	-3.54	
Property Tax	.00	
RETURN TO LAND	-3.54	

APPENDIX A

DETAILED POWER AND EQUIPMENT CALCULATIONS

Field Capacity

The time required to cover an acre, or its "field capacity", was the first calculation for each machine. This time was calculated using the formula:

$$\text{hours/acre} = \frac{8.25 \times \text{trips over the field per year}}{\text{width (feet)} \times \text{speed (mph)} \times \text{field efficiency (decimal)}}$$

Field efficiency is an adjustment for losses resulting from failure to use the full machine width, turning, and minor interruptions. Most machines make one trip over the field per year but the hay harvesting machinery is used two or three times. The pasture establishment machinery is used less than once per year when averaged over the life of the stand. Tractor hours per acre are the sum of hours for the machines used with each tractor. Appendix Table A1 shows widths, speeds, field efficiencies, and tractor used by machine for soil group 1. Trips over the field per year are shown in Appendix Table A2. Speed and trips over the field were adjusted for the other soil groups based on quantities harvested and number of hay cuttings.

Fuel, Oil and Grease Costs

The costs of fuel, oil, and grease per hour were calculated for each tractor and the truck using:

$$\text{fuel, oil and grease} = \text{fuel coefficient} \times \text{horsepower} \times \text{fuel cost} \times \text{fuel multiplier}$$

The fuel coefficient is 0.0504 for the 90 horsepower and 50 horsepower diesel tractors and 0.0690 for the 35 horsepower gasoline tractor. These coefficients are based on University of Nebraska tractor test data for average conditions. The fuel multiplier was adjusted up or down for

individual machines to reflect different load conditions (Appendix Table A3). Fuel costs for the pickup truck were calculated based on driving 6,000 miles per year and 15 miles per gallon. The truck costs were allocated equally across all acres and between growing and harvesting activities.

Repair and Maintenance Costs

Repair and maintenance costs were calculated using a formula developed by the American Society of Agricultural Engineers. Annual hours of use were calculated for each machine by multiplying hours per acre times acres of each crop in the average rotation, and summing across crops. Multiplying annual hours of use times the nine years each machine is owned then gives accumulated hours of use.

Accumulated repair and maintenance costs over the number of years owned were then calculated using coefficients from Appendix Table A3 and:

$$\begin{array}{lcl} \text{Accumulated repairs} & & 0.01 \times \text{machine price} \times \text{repair 1} \times (\text{accumulated} \\ \text{and maintenance} & = & \text{hours} \times 100/\text{wearout life}) \text{ repair 2} \end{array}$$

Repair and maintenance costs per hour were calculated by dividing accumulated costs by accumulated hours, and then multiplied by hours per acre to give cost per acre for each machine.

APPENDIX TABLE A1
POWER AND EQUIPMENT CHARACTERISTICS
SOIL GROUP 1

Machine	Width (feet)	Speed (mph)	Field Efficiency	Used with Tractor (horsepower)
Plow, semi-mounted, 4-16" bottoms	5.33	4.8	.80	90
Disc harrow	12	4.5	.80	90
Springtooth harrow	16	4.5	.80	90
Cultipacker ¹	12	4.5	.80	90
Corn planter, 4-row	12	4.5	.73	50
Cultivator, 4-row	12	4.5	.80	50
Sprayer, trailer w/tank	30	4.5	.65	50
Cultipacker seeder	10	4.5	.68	35
Fertilizer spreader	12	4.0	.68	50
Mower-conditioner, windrower	9	5.0	.73	90
Side delivery rake	9	4.5	.78	50
Baler with bale thrower	18	2.7	.73	90
Bale wagons, 3 ²	--	--	--	50
Forage harvester with 2-row crop head	6	2.5	.68	90
Forage wagons, 2 ³	--	--	--	35
Forage blower		-35 T/hr.-		

¹Pulled in tandem with the disk, so hours not added into 90 horsepower tractor hours.

²Bale wagons were assumed to be used the same number of hours as the baler, with one on the baler, one being unloaded and one in transit. The 50 horsepower tractor is in use half as many hours towing wagons as the baler is in use.

³Forage wagons were assumed to be in use the same number of hours as the forage harvester, with one pulled behind the harvester while the other is unloaded and in transit. The 35 horsepower tractor is in use as many hours towing wagons as the forage harvester is in use.

APPENDIX TABLE A2
MACHINE USE BY CROP-TRIPS OVER THE FIELD BY YEAR
SOIL GROUP 1

Machine	Corn Silage		Hay Seeding Year		Hay Established		Pasture Growing
	Grow- ing	Harv.	Grow- ing	Harv.	Grow- ing	Harv.	
Plow, semi-mounted, 4-16" bottoms	1		1				0.1
Disc harrow	2		1				0.1
Springtooth harrow	1		1				0.1
Cultipacker	1		1				0.1
Corn planter, 4-row	1						
Cultivator, 4-row	0.5						
Sprayer, trailer w/tank	1		2		1		1
Cultipacker seeder			1				0.1
Fertilizer spreader			1		1		1
Mower-cond., windrower				3		3	
Side delivery rake				4		4	
Baler with bale thrower				3		3	
Forage harvester with 2-row crop head		1					

APPENDIX TABLE A3
MACHINE FUEL, REPAIRS, AND MAINTENANCE CHARACTERISTICS
ALL SOIL GROUPS

Machine	Fuel Multiplier	Repair 1	Repair 2	Wearout Life (hours)
Tractor, 2-wheel drive, 90hp	—			
Tractor, 2-wheel drive, 50hp	—	0.12	1.5	12,000
Tractor, 2-wheel drive, 35hp	—	0.12	1.5	12,000
Plow, semi-mounted, 4-16" bottoms	1.33	0.301	1.3	2,500
Disc harrow	1	0.301	1.3	2,500
Springtooth harrow	1	0.301	1.3	2,500
Cultipacker	0 ¹	0.301	1.3	2,500
Corn planter, 4-row	1	0.159	1.4	1,200
Cultivator, 4-row	1	0.301	1.3	2,500
Sprayer, trailer w/tank	0.67	0.127	1.4	1,200
Cultipacker seeder	1	0.159	1.4	1,200
Fertilizer spreader	0.67	0.191	1.4	1,200
Mower-conditioner, windrower	1	0.159	1.4	2,000
Side delivery rake	0.67	0.159	1.4	2,500
Baler with bale thrower	1	0.127	1.4	2,500
Bale wagons, 3	0.67	0.159	1.4	5,000
Forage harvester with 2-row crop head	1.33	0.127	1.4	2,000
Forage wagons, 2	1	0.159	1.4	5,000
Forage blower	1.33	0.127	1.4	2,000

¹Used in tandem with disc harrow.

APPENDIX B

DETAILED CROP PRICE CALCULATIONS

Published crop prices are adjusted to reflect harvest time prices as well as expected quality differentials for hay and a farm gate price basis for corn. This is required to be consistent with the philosophy followed in construction of the economic profiles.

Hay

The price per unit of the major micro nutrients, protein, and energy is calculated based on corn grain and soybean meal. Corn and soybean meal prices during July through September are used as the basis for valuing hay of differing protein and energy content. The nutrient content of corn grain and soybean meal is presented in Appendix Table B1.

APPENDIX TABLE B1
CORN GRAIN AND SOYBEAN MEAL NUTRIENT CONTENT

	Dry Matter %	Crude Protein % of Dry Matter	Net Energy Mcal/lb. of Dry Matter
Corn Grain	89	10.0	0.91
Soybean Meal	90	48.9	0.92

Using simultaneous equations the price per unit of protein and energy is determined. These values are then applied to the nutrient contents of hay specified in Table 4. Next, the resulting hay prices are adjusted to reflect the forage market. This is accomplished by computing the relationship of the published alfalfa hay price to its calculated price based on corn grain and soybean meal and applying the resulting adjustment factor to all hay qualities.

Corn

Corn silage and corn grain prices are both used to obtain a price for corn, which is used as a corn silage price. Harvest time prices for corn grain in October and November are weighted with the corn silage price based on the acreage of each harvested in the state.

Prior to weighting the corn prices by acreage, the corn grain and corn silage prices are adjusted to a farm gate basis. This is accomplished for corn grain by subtracting transportation costs to deliver the grain to market and drying costs for one half of the grain which was not previously accounted for in the published price (Appendix Table B2). Corn silage was converted to a farm gate price by deducting a storage charge as the published price quotes prices in storage.

APPENDIX TABLE B2
TRANSPORTATION AND DRYING COSTS

Transportation	.14 cents per bushel
Drying	.13 cents per bushel

Adjusted corn silage and corn grain prices are converted to a silage price by multiplying corn grain by the factor of 5.88. This factor reflects the number of bushels of corn grain in a ton of corn silage.