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**BUDGETING DATA FOR
LIMITED RESOURCE DAIRY FARMS,
NEW YORK**

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PART I

Annual Expenses of Forage Crops Monthly Labor Requirements of Forage Crops

The budgeting data for limited resource dairy farms in New York were developed in association with a study of adjustment opportunities on such farms in the late 1980s as reported in Cornell A.E. Research 89-10, "Management Strategies to Improve Profitability on Limited Resource Dairy Farms: A Linear Programming Analysis," by Roy Murray-Prior and B. F. Stanton, June 1989. These detailed tables report the assumptions required for the budgets and subsequent linear programming solutions. Substantial assistance in obtaining these coefficients was provided by faculty and staff in the Departments of Agronomy, Animal Science and Agricultural Engineering. Insofar as possible, sources of data are cited in association with each table. A more complete bibliography of sources is provided in A.E. Research 89-10.

List of Tables

Number

- 1 Budget for One Acre of Corn Silage on Soil Group Three for Small Tractor-Bucket Farm
- 2 Annual Budget for One Acre of Corn Silage on Soil Group Six for Small Tractor-Bucket Farm
- 3 Annual Budget for One Acre of Corn Silage on Soil Group Three for Large Tractor-Pipeline Farm
- 4 Annual Budget for One Acre of Corn Silage on Soil Group Six for Large Tractor-Pipeline Farm
- 5 Budget for Establishment Year of One Acre of Alfalfa-Timothy Hay on Soil Group Three for Small Tractor-Bucket Farm
- 6 Budget for Years Two and Three for One Acre of Alfalfa-Timothy Hay on Soil Group Three for Small Tractor-Bucket Farm
- 7 Budget for Years Four and Five for One Acre of Alfalfa-Timothy Hay on Soil Group Three for Small Tractor-Bucket Farm
- 8 Budget for Establishment Year for One Acre of Alfalfa-Timothy Hay on Soil Group Three for Large Tractor-Pipeline Farm
- 9 Budget for Years Two and Three for One Acre of Alfalfa-Timothy Hay/Silage on Soil Group Three for Large Tractor-Pipeline Farm
- 10 Budget for Years Four and Five for One Acre of Alfalfa-Timothy Hay/Silage on Soil Group Three for Large Tractor-Pipeline Farm
- 11 Budget for Years Two and Three for One Acre of Alfalfa-Timothy Hay on Soil Group Three for Large Tractor-Pipeline Farm
- 12 Budget for Years Four and Five for One Acre of Alfalfa-Timothy Hay on Soil Group Three for Large Tractor-Pipeline Farm
- 13 Budget for Establishment Year for One Acre of Trefoil-Alfalfa-Timothy Hay on Soil Group Six for Small Tractor-Bucket Farm

Number

- 14 Budget for Years Two, Three and Four for One Acre of Trefoil-Alfalfa-Timothy Hay on Soil Group Six for Small Tractor-Bucket Farm
- 15 Budget for Years Five, Six and Seven for One Acre of Trefoil-Alfalfa-Timothy Hay on Soil Group Six for Small Tractor-Bucket Farm
- 16 Budget for Establishment Year for One Acre of Trefoil-Alfalfa-Timothy Hay on Soil Group Six for Large Tractor-Pipeline Farm
- 17 Budget for Years Two, Three and Four for One Acre of Trefoil-Alfalfa-Timothy Hay on Soil Group Six for Large Tractor-Pipeline Farm
- 18 Budget For Years Five, Six and Seven for One Acre of Trefoil-Alfalfa-Timothy Hay on Soil Group Six for Large Tractor-Pipeline Farm
- 19 Budget for Harvesting Rented, Unimproved Pasture Hay Off Soil Group Six Land for Small Tractor-Bucket Farm
- 20 Budget for Harvesting Rented, Unimproved Pasture Hay Off One Acre of Soil Group Six Land for Large Tractor-Pipeline Farm
- 21 Budget for Grazing One Acre of Unimproved Pasture on Small-Tractor-Bucket and Large Tractor-Pipeline Farms
- 22 Monthly Labor Requirements Per Acre of Forage Crops for Small Tractor-Bucket Farm
- 23 Monthly Labor Requirements Per Acre of Forage Crops for Large Tractor-Pipeline Farm
- 24 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Corn Silage on SB Farms
- 25 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Corn Silage on LP Farms
- 26 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Alfalfa-Timothy on Soil Group Three on SB Farms
- 27 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Alfalfa-Timothy on Soil Group Three on LP Farms

Number

- 28 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Trefoil-Alfalfa-Timothy on Soil Group Six on SB Farms
- 29 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Trefoil-Alfalfa-Timothy on Soil Group Six on LP Farms
- 30 Timing of Operations, Tractor and Labor Hours and Equipment Cost per Acre of Rented Standing Hay on Soil Group Six for SB and LP Farms
- 31 List Price and Characteristics of Machinery Complement for Small Tractor-Bucket Farms
- 32 List Price and Characteristics of Machinery Complement for Large Tractor-Pipeline Farms
- 33 Maximum Dry Matter Intake for Cows and Heifers
- 34 Calculation of Net Energy Requirements for Heifers from 3 to 30 Months in Mcals per Heifer
- 35 Minimum Adjusted Crude Protein Requirements for Cows and Heifers
- 36 Harvest, Storage and Feeding Losses of Farm Produced and Purchased Feeds
- 37 Nutrient Content of Feeds for Large Tractor-Pipeline Farms
- 38 Nutrient Content of Forages at Earlier Harvest Dates
- 39 Construction and Annual Ownership Costs of Silos
- 40 Estimated Equipment and Ownership Costs for Small Tractor-Bucket Farm
- 41 Estimated Equipment and Ownership Costs for Large Tractor-Pipeline Farm

Table 1. BUDGET FOR ONE ACRE OF CORN SILAGE ON SOIL GROUP THREE FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
<u>Crop products^a</u>				
Silage	tn	11.5		
ANNUAL EXPENSES				
GROWING				
<u>Seed^b</u>				
Corn	80K un	0.34	\$60.00	\$ 20.40
<u>Fertilizer^c</u>				
N	lb	75	\$ 0.20	\$ 15.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^d</u>				
Atrazine 4L	gl	0.45	\$ 8.37	\$ 3.77
Crop oil	gl	0.10	\$10.40	\$ 1.04
Sutan & 6.7E	gl	0.36	\$22.47	\$ 8.09
Furadan 15G	lb	6.00	\$ 1.38	\$ 8.28
<u>Power, equipment^e</u>				
Fuel, oil			\$ 8.07	\$ 8.07
Repair, maintenance			\$ 5.71	\$ 5.71
Other ^f			\$ 2.00	\$ 2.00
Total growing				\$ 98.96
HARVESTING				
<u>Power, equipment^e</u>				
Fuel, oil			\$10.49	\$ 10.49
Repair, maintenance			\$13.74	\$ 13.74
Twine	/ton hay		\$ 0.00	\$ 0.00
Other			\$ 5.00	\$ 5.00
Total harvesting				\$ 29.23
INTEREST OPERATING				
Months ^g		\$128.19	Rate/yr	
		12	12.00%	\$ 15.38
Total Annual				\$143.57

- Silage yields from averages for FMES of SB farms.
- Planting rate 27,000 seeds/ac, Cornell recommends.
- Custom applications of 75-60-60 per year, Twentyman & Whitaker.
- Chemical applications as per Twentyman & Whitaker, adjusted for five year rotation.
- Calculated using LOTUS machinery template, Lazarus, 1986.
- From Snyder and Lazarus, 1986.
- Average of 12 months interest on operating costs.

Table 2. ANNUAL BUDGET FOR ONE ACRE OF CORN SILAGE
ON SOIL GROUP SIX FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
GROWING				
<u>Seed^a</u>				
Corn	80K un	0.27	\$60.00	\$ 16.20
<u>Fertilizer^b</u>				
N	lb	50	\$ 0.20	\$ 10.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Atrazine 4L	gl	0.58	\$ 8.37	\$ 4.88
Crop oil	gl	0.17	\$10.40	\$ 1.77
Sutan & 6.7E	gl	0.20	\$22.47	\$ 4.49
Furadan 15G	lb	3.33	\$ 1.38	\$ 4.60
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.07
Repair, maintenance				\$ 5.71
Other ^e			\$ 2.00	\$ 2.00
Total growing				\$ 84.32
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 10.29
Repair, maintenance				\$ 13.59
Other			\$ 5.00	\$ 5.00
Total harvesting				\$ 28.88
INTEREST OPERATING				
Months ^f		\$113.20	Rate/yr	
		12	12.00%	\$ 13.58
Total Annual				\$126.79

- Planting rate 21,850 seeds/ac, Cornell recommends.
- Custom applications of 50-60-60 per year, Twentyman & Whitaker.
- Chemical applications as per Twentyman & Whitaker, adjusted for three year rotation.
- Calculated using LOTUS machinery template, Lazarus, 1986.
- From Snyder and Lazarus, 1986.
- Average of 12 months interest on operating costs.

Table 3. ANNUAL BUDGET FOR ONE ACRE OF CORN SILAGE
ON SOIL GROUP THREE FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
GROWING				
<u>Seed^a</u>				
Corn	80K un	0.34	\$60.00	\$ 20.40
<u>Fertilizer^b</u>				
N	lb	75	\$ 0.20	\$ 15.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Atrazine 4L	gl	0.45	\$ 8.37	\$ 3.77
Crop oil	gl	0.10	\$10.40	\$ 1.04
Sutan & 6.7E	gl	0.36	\$22.47	\$ 8.09
Furadan 15G	lb	6.00	\$ 1.38	\$ 8.28
<u>Power, equipment^d</u>				
Fuel, oil				\$ 7.83
Repair, maintenance				\$ 5.06
Other ^e			\$ 2.00	\$ 2.00
Total growing				\$ 98.07
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.98
Repair, maintenance				\$ 10.20
Other			\$ 5.00	\$ 5.00
Total harvesting				\$ 24.18
INTEREST OPERATING				
Months ^f		\$122.25	Rate/yr	
		12	12.00%	\$ 14.67
Total Annual				\$136.92

- Planting rate 27,000 seeds/ac, Cornell recommends.
- Custom applications of 75-60-60 per year, Twentyman & Whitaker.
- Chemical applications as per Twentyman & Whitaker, adjusted for five year rotation.
- Calculated using LOTUS machinery template, Lazarus, 1986.
- From Snyder and Lazarus, 1986.
- Average of 12 months interest on operating costs.

Table 4. ANNUAL BUDGET FOR ONE ACRE OF CORN SILAGE
ON SOIL GROUP SIX FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
GROWING				
<u>Seed^a</u>				
Corn	80K un	0.27	\$60.00	\$ 16.20
<u>Fertilizer^b</u>				
N	lb	50	\$ 0.20	\$ 10.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Atrazine 4L	gl	0.58	\$ 8.37	\$ 4.88
Crop oil	gl	0.17	\$10.40	\$ 1.77
Sutan & 6.7E	gl	0.20	\$22.47	\$ 4.49
Furadan 15G	lb	3.33	\$ 1.38	\$ 4.60
<u>Power, equipment^d</u>				
Fuel, oil				\$ 7.83
Repair, maintenance				\$ 5.06
Other ^e			\$ 2.00	\$ 2.00
Total growing				\$ 83.43
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.75
Repair, maintenance				\$ 10.03
Other			\$ 5.00	\$ 5.00
Total harvesting				\$ 23.78
INTEREST OPERATING		\$107.21	Rate/yr	
Months ^f		12	12.00%	\$ 12.87
Total Annual				\$120.08

- a. Planting rate 21,850 seeds/ac, Cornell recommends.
b. Custom applications of 50-60-60 per year, Twentymen & Whitaker.
c. Chemical applications as per Twentymen & Whitaker, adjusted for three year rotation.
d. Calculated using LOTUS machinery template, Lazarus, 1986.
e. From Snyder and Lazarus, 1986.
f. Average of 12 months interest on operating costs.

Table 5. BUDGET FOR ESTABLISHMENT YEAR OF ONE ACRE
OF ALFALFA-TIMOTHY HAY
ON SOIL GROUP THREE FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
GROWING				
<u>Seed^a</u>				
Alfalfa	lb	12	\$ 2.90	\$ 34.80
Timothy	lb	5	\$ 0.80	\$ 4.00
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac		\$ 5.00	\$ 5.00
Lime ^c	tn	2.5	\$25.00	\$ 62.50
<u>Chemicals^d</u>				
Premerge	gl	0.33	\$13.00	\$ 4.29
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
<u>Power, equipment^e</u>				
Fuel, oil			\$ 7.65	\$ 7.65
Repair, maintenance			\$ 4.81	\$ 4.81
Other ^f			\$ 2.00	\$ 2.00
Total growing				\$149.62
HARVESTING				
<u>Power, equipment^e</u>				
Fuel, oil			\$ 4.12	\$ 4.12
Repair, maintenance			\$ 3.60	\$ 3.60
Twine ^g	/ton hay		\$ 2.00	\$ 2.90
Other			\$ 1.45	\$ 1.45
Total harvesting				\$ 12.07
INTEREST OPERATING				
Months ^h		\$161.69	Rate/yr	
		12	12.00%	\$ 19.40
Total Annual				\$181.09

- a. Seeding rates based on 1988 Cornell recommends for field crops.
b. Fertilizer requirement from Twentyman and Whitaker, 1986.
c. Based on .25t/year requirement (Reid) and a ten year rotation.
All applied in establishment year.
d. Adapted from Twentyman and Whitaker, 1986.
e. Calculated using LOTUS machinery template, Lazarus, 1986.
f. From Snyder and Lazarus, 1986.
g. Average of 12 months interest on operating costs.

Table 6. BUDGET FOR YEARS TWO AND THREE FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY
ON SOIL GROUP THREE FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	2.53		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	40	\$ 0.22	\$ 8.80
K	lb	120	\$ 0.14	\$ 16.80
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 33.57
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 10.30
Repair, maintenance				\$ 9.01
Twine ^f		/ton hay	\$ 2.00	\$ 5.06
Other ^e			\$ 2.23	\$ 2.23
Total harvesting				\$ 26.60
INTEREST OPERATING				
Months ^g		\$ 60.17	Rate/yr	
		12	12.00%	\$ 7.22
Total Annual				\$ 67.39

- a. All two and one-half cuts to hay.
- b. Custom applications of 0-40-120 per year, Twentyman & Whitaker.
- c. Adapted from Twentyman and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 7. BUDGET FOR YEARS FOUR AND FIVE FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY
ON SOIL GROUP THREE FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.82		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	20	\$ 0.22	\$ 4.40
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 20.77
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.24
Repair, maintenance				\$ 7.21
Twine ^f	/ton hay		\$ 2.00	\$ 3.64
Other ^e			\$ 1.60	\$ 1.60
Total harvesting				\$ 20.69
INTEREST OPERATING				
Months ^g		\$ 41.46	Rate/yr	
		12	12.00%	\$ 4.98
Total Annual				\$ 46.44

- a. Both cuts to hay.
- b. Custom applications at one-half rate for year 2.
- c. Adapted from Twentyman and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 8. BUDGET FOR ESTABLISHMENT YEAR FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY
ON SOIL GROUP THREE FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.45		
GROWING				
<u>Seed^b</u>				
Alfalfa	lb	12	\$ 2.90	\$ 34.80
Timothy	lb	5	\$ 0.80	\$ 4.00
<u>Fertilizer^c</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac		\$ 5.00	\$ 5.00
Lime ^d	tn	2.5	\$25.00	\$ 62.50
<u>Chemicals^e</u>				
Premerge	gl	0.33	\$13.00	\$ 4.29
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
<u>Power, equipment^f</u>				
Fuel, oil				\$ 7.31
Repair, maintenance				\$ 3.92
Other ^f			\$ 2.00	\$ 2.00
Total growing				\$148.39
HARVESTING				
<u>Power, equipment^g</u>				
Fuel, oil				\$ 4.46
Repair, maintenance				\$ 3.86
Twine ^h		/ton hay	\$ 2.00	\$ 2.90
Other			\$ 1.45	\$ 1.45
Total harvesting				\$ 12.67
INTEREST, OPERATING		\$161.06	Rate/yr	
Months ⁱ		12	12.00%	\$ 19.33
Total Annual				\$180.39

- One cut, 50 percent of first year yield.
- Seeding rates from Cornell recommends.
- Twentyman and Whitaker, 1986.
- Based on .25t/year requirement (Reid) and a ten year rotation. All applied in establishment year.
- Adapted from Twentyman and Whitaker, 1986.
- Calculated using LOTUS machinery template, Lazarus, 1986.
- From Snyder and Lazarus, 1986.
- Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- Average of 12 months interest on operating costs.

Table 9. BUDGET FOR YEARS TWO AND THREE FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY/SILAGE
ON SOIL GROUP THREE FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.25		
Silage	tn	3.34		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	40	\$ 0.22	\$ 8.80
K	lb	120	\$ 0.14	\$ 16.80
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 33.57
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 11.14
Repair, maintenance				\$ 10.98
Twine ^f	/ton hay		\$ 2.00	\$ 2.50
Other ^e			\$ 2.74	\$ 2.74
Total harvesting				\$ 27.36
INTEREST OPERATING				
Months ^g		\$ 60.93	Rate/yr	
		12	12.00%	\$ 7.31
Total Annual				\$ 68.24

- a. First cut silage, 2nd and 3rd cuts to hay.
b. Custom applications of 0-40-120 per year, Twentyman & Whitaker.
c. Adapted from Twentyman and Whitaker, 1986.
d. Calculated using LOTUS machinery template, Lazarus, 1986.
e. From Snyder and Lazarus, 1986.
f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
g. Average of 12 months interest on operating costs.

Table 10. BUDGET FOR YEARS FOUR AND FIVE FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY/SILAGE
ON SOIL GROUP THREE FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	0.90		
Silage	tn	2.41		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	20	\$ 0.22	\$ 4.40
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 20.77
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.97
Repair, maintenance				\$ 9.09
Twine ^f		/ton hay	\$ 2.00	\$ 1.80
Other ^e			\$ 1.97	\$ 1.97
Total harvesting				\$ 21.83
INTEREST OPERATING				
Months ^g		\$ 42.60	Rate/yr	
		12	12.00%	\$ 5.11
Total Annual				\$ 47.72

- a. First cut silage, 2nd cut to hay.
- b. Custom applications at one-half rate for year 2.
- c. Adapted from Twentyman and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 11. BUDGET FOR YEARS TWO AND THREE FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY
ON SOIL GROUP THREE FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	2.53		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	40	\$ 0.22	\$ 8.80
K	lb	120	\$ 0.14	\$ 16.80
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 33.57
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 11.14
Repair, maintenance				\$ 9.66
Twine ^f		/ton hay	\$ 2.00	\$ 5.06
Other ^e			\$ 2.23	\$ 2.23
Total harvesting				\$ 28.09
INTEREST OPERATING				
Months ^g		\$ 61.66	Rate/yr	
		12	12.00%	\$ 7.40
Total Annual				\$ 69.06

- a. All two and one-half cuts to hay.
b. Custom applications of 0-40-120 per year, Twentyman & Whitaker.
c. Adapted from Twentyman and Whitaker, 1986.
d. Calculated using LOTUS machinery template, Lazarus, 1986.
e. From Snyder and Lazarus, 1986.
f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
g. Average of 12 months interest on operating costs.

Table 12. BUDGET FOR YEARS FOUR AND FIVE FOR ONE ACRE
OF ALFALFA-TIMOTHY HAY
ON SOIL GROUP THREE FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.82		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	20	\$ 0.22	\$ 4.40
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 20.77
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.91
Repair, maintenance				\$ 7.73
Twine ^f		/ton hay	\$ 2.00	\$ 3.64
Other ^e			\$ 1.60	\$ 1.60
Total harvesting				\$ 21.88
INTEREST OPERATING				
Months ^g		\$ 42.65	Rate/yr	
		12	12.00%	\$ 5.12
Total Annual				\$ 47.77

- a. Both cuts to hay.
- b. Custom applications at one-half rate for year 2.
- c. Adapted from Twentyman and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 13. BUDGET FOR ESTABLISHMENT YEAR FOR ONE ACRE
OF TREFOIL-ALFALFA-TIMOTHY HAY
ON SOIL GROUP SIX FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.18		
GROWING				
<u>Seed^a</u>				
Trefoil	lb	4	\$ 4.04	\$ 16.16
Timothy	lb	6	\$ 0.80	\$ 4.80
Alfalfa	lb	6	\$ 2.90	\$ 17.40
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac		\$ 5.00	\$ 5.00
Lime ^c	tn	2.5	\$25.00	\$ 62.50
<u>Chemicals^d</u>				
Premerge	gl	0.33	\$13.00	\$ 4.29
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
<u>Power, equipment^e</u>				
Fuel, oil				\$ 7.65
Repair, maintenance				\$ 4.81
Other ^f			\$ 2.00	\$ 2.00
Total growing				\$149.18
HARVESTING				
<u>Power, equipment^e</u>				
Fuel, oil			\$ 4.12	\$ 4.12
Repair, maintenance			3.60	\$ 3.60
Twine ^g	/ton hay		\$ 2.00	\$ 2.36
Other			\$ 1.18	\$ 1.18
Total harvesting				\$ 11.26
INTEREST OPERATING				
Months ^h		\$160.44	Rate/yr	
		12	12.00%	\$ 19.25
Total Annual				\$179.69

- a. One cut, 50 percent of first year yield.
- b. Seeding rates from Cornell recommends.
- c. Twentyman and Whitaker, 1986.
- d. Based on .25t/year requirement (Reid) and a ten year rotation. All applied in establishment year.
- e. Adapted from Twentyman and Whitaker, 1986.
- f. Calculated using LOTUS machinery template, Lazarus, 1986.
- g. From Snyder and Lazarus, 1986.
- h. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- i. Average of 12 months interest on operating costs.

Table 14. BUDGET FOR YEARS TWO, THREE AND FOUR FOR ONE ACRE
OF TREFOIL-ALFALFA-TIMOTHY HAY
ON SOIL GROUP SIX FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	2.06		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	30	\$ 0.22	\$ 6.60
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 22.97
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 8.24
Repair, maintenance				\$ 7.21
Twine ^f		/ton hay	\$ 2.00	\$ 4.12
Other ^e			\$ 1.81	\$ 1.81
Total harvesting				\$ 21.38
INTEREST OPERATING				
Months ^g		\$ 44.35	Rate/yr	
		12	12.00%	\$ 5.32
Total Annual				\$ 49.68

- a. Both cuts to hay.
- b. Custom applications of 0-30-60 per year, Twentyman & Whitaker.
- c. Adapted from Twentyman and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 15. BUDGET FOR YEARS FIVE, SIX AND SEVEN FOR ONE ACRE
OF TREFOIL-ALFALFA-TIMOTHY HAY
ON SOIL GROUP SIX FOR SMALL TRACTOR-BUCKET FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.25		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	15	\$ 0.22	\$ 3.30
K	lb	30	\$ 0.14	\$ 4.20
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 15.47
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 4.12
Repair, maintenance				\$ 3.60
Twine ^f	/ton hay		\$ 2.00	\$ 2.50
Other ^e			\$ 1.10	\$ 1.10
Total harvesting				\$ 11.32
INTEREST OPERATING				
Months ^g		\$ 26.79	Rate/yr	
		12	12.00%	\$ 3.21
Total Annual				\$ 30.00

- a. One hay cut only.
b. Custom applications at one-half rate for year 2.
c. Adapted from Twentyman and Whitaker, 1986.
d. Calculated using LOTUS machinery template, Lazarus, 1986.
e. From Snyder and Lazarus, 1986.
f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
g. Average of 12 months interest on operating costs.

Table 16. BUDGET FOR ESTABLISHMENT YEAR FOR ONE ACRE
OF TREFOIL-ALFALFA-TIMOTHY HAY
ON SOIL GROUP SIX FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.18		
GROWING				
<u>Seed^a</u>				
Trefoil	lb	4	\$ 4.04	\$ 16.16
Timothy	lb	6	\$ 0.80	\$ 4.80
Alfalfa	lb	6	\$ 2.90	\$ 17.40
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	60	\$ 0.22	\$ 13.20
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac		\$ 5.00	\$ 5.00
Lime ^c	tn	2.5	\$25.00	\$ 62.50
<u>Chemicals^d</u>				
Premerge	gl	0.33	\$13.00	\$ 4.29
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
<u>Power, equipment^e</u>				
Fuel, oil				\$ 7.31
Repair, maintenance				\$ 3.92
Other ^f			\$ 2.00	\$ 2.00
Total growing				\$147.95
HARVESTING				
<u>Power, equipment^e</u>				
Fuel, oil				\$ 4.46
Repair, maintenance				\$ 3.86
Twine ^g	/ton hay		\$ 2.00	\$ 2.36
Other			\$ 1.18	\$ 1.18
Total harvesting				\$ 11.86
INTEREST OPERATING				
Months ^h		\$159.81	Rate/yr	
		12	12.00%	\$ 19.18
Total Annual				\$178.99

- One cut, 50 percent of first year yield.
- Seeding rates from Cornell recommends.
- Twentyman and Whitaker, 1986.
- Based on .25t/year requirement (Reid) and a ten year rotation. All applied in establishment year.
- Adapted from Twentyman and Whitaker, 1986.
- Calculated using LOTUS machinery template, Lazarus, 1986.
- From Snyder and Lazarus, 1986.
- Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- Average of 12 months interest on operating costs.

Table 17. BUDGET FOR YEARS TWO, THREE AND FOUR FOR ONE ACRE
OF TREFOIL-ALFALFA-TIMOTHY HAY
ON SOIL GROUP SIX FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS ^a				
Hay	tn	2.06		
GROWING				
<u>Fertilizer</u> ^b				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	30	\$ 0.22	\$ 6.60
K	lb	60	\$ 0.14	\$ 8.40
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals</u> ^c				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 22.97
HARVESTING				
<u>Power, equipment</u> ^d				
Fuel, oil				\$ 8.91
Repair, maintenance				\$ 7.73
Twine ^f		/ton hay	\$ 2.00	\$ 4.12
Other ^e			\$ 1.81	\$ 1.81
Total harvesting				\$ 22.57
INTEREST OPERATING				
Months ^g		\$ 45.54	Rate/yr	
		12	12.00%	\$ 5.47
Total Annual				\$ 51.01

- a. Both cuts to hay.
- b. Custom applications of 0-30-60 per year, Twentymen & Whitaker.
- c. Adapted from Twentymen and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 18. BUDGET FOR YEARS FIVE, SIX AND SEVEN FOR ONE ACRE
OF TREFOIL-ALFALFA-TIMOTHY HAY
ON SOIL GROUP SIX FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.25		
GROWING				
<u>Fertilizer^b</u>				
N	lb	0	\$ 0.20	\$ 0.00
P	lb	15	\$ 0.22	\$ 3.30
K	lb	30	\$ 0.14	\$ 4.20
Custom application	ac	1	\$ 5.00	\$ 5.00
<u>Chemicals^c</u>				
Methoxychlor 2E	gl	0.25	\$11.88	\$ 2.97
Total growing				\$ 15.47
HARVESTING				
<u>Power, equipment^d</u>				
Fuel, oil				\$ 4.46
Repair, maintenance				\$ 3.86
Twine ^f		/ton hay	\$ 2.00	\$ 2.50
Other ^e			\$ 1.10	\$ 1.10
Total harvesting				\$ 11.92
INTEREST OPERATING				
Months ^g		\$ 27.39	Rate/yr	
		12	12.00%	\$ 3.29
Total Annual				\$ 30.68

- a. One hay cut only.
- b. Custom applications at one-half rate for year 2.
- c. Adapted from Twentyman and Whitaker, 1986.
- d. Calculated using LOTUS machinery template, Lazarus, 1986.
- e. From Snyder and Lazarus, 1986.
- f. Twine \$2.00/ton, from Snyder and Lazarus, 1986.
- g. Average of 12 months interest on operating costs.

Table 19. BUDGET FOR HARVESTING RENTED, UNIMPROVED PASTURE
HAY OFF SOIL GROUP SIX LAND
FOR SMALL TRACTOR-BUCKET FARM

	Quantity	Price	Cost
GROWING ^a			\$ 0.00
HARVESTING			
<u>Power, equipment</u> ^b			
Fuel, oil		\$4.12	\$ 4.12
Repair, maintenance		3.60	3.60
Twine ^c	/ton hay	2.00	2.30
Other		1.32	1.32
Total harvesting			\$11.34
INTEREST, OPERATING	\$11.34	Rate/yr	
Months ^d	12	12.00%	\$ 1.36
Total Annual			\$12.70

- a. None.
b. Calculated using LOTUS machinery template, Lazarus, 1986.
c. From Snyder and Lazarus, 1986.
d. Average of 12 months interest on operating costs.

Table 20. BUDGET FOR HARVESTING RENTED, UNIMPROVED PASTURE HAY
OFF ONE ACRE OF SOIL GROUP SIX LAND
FOR LARGE TRACTOR-PIPELINE FARM

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Hay	tn	1.15		
ANNUAL EXPENSES				
Growing ^b				
HARVESTING				
<u>Power, equipment^c</u>				
Fuel, oil				\$ 4.46
Repair, maintenance				3.86
Twine ^d		/ton hay	\$2.00	2.30
Other			1.32	1.32
Total harvesting				\$11.94
INTEREST, OPERATING		\$11.94	Rate/yr	
Months ^e		12	12.00%	\$ 1.43
Total Annual				\$13.37

- a. Pasture yield from Twentyman, Whitaker and Rayburn, p. 76.
- b. None.
- c. Calculated using LOTUS machinery template, Lazarus, 1986.
- d. From Snyder and Lazarus, 1986.
- e. Average of 12 months interest on operating costs.

Table 21. BUDGET FOR GRAZING ONE ACRE OF UNIMPROVED PASTURE
ON SMALL TRACTOR-BUCKET AND
LARGE TRACTOR-PIPELINE FARMS

	Unit	Quantity	Price	Cost
CROP PRODUCTS^a				
Grazing	tn	3.57		
ANNUAL EXPENSES				
Growing ^b				
HARVESTING				
Power, equipment ^c				
Fuel, oil				\$ 2.00
Repair, maintenance				2.00
Other ^d			\$1.00	1.00
Total harvesting				\$ 5.00
INTEREST, OPERATING				
Months ^e		\$5.00	Rate/yr	
		12	12.00%	\$ 0.60
Total Annual				\$ 5.60

- a. Pasture yield from Twentyman, Whitaker and Rayburn, p. 76 in tons of wet material at 28 percent dry matter.
- b. None.
- c. Clipping once per year, Hlubek, J. G. and T. R. Smith.
- d. Fencing repair and maintenance.
- e. Average of 12 months interest on operating costs.

PART II
Forage Crop Equipment Budgets

Table 24. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF CORN SILAGE ON SB FARMS

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M \$/ac	Fuel & Oil \$/ac
<u>Soil Group 3</u>							
Plow	Moldboard	Nov. 1-Nov. 30	0.33	0.46	0.38	1.10	1.69
Fertilize	Custom						
Plow	Moldboard plow	Apr. 1-Apr. 30	0.67	0.93	0.78	2.24	3.44
Disk	Disk harrow	Apr. 14-Apr. 30	1	0.27	0.22	0.56	0.97
Harrow	Springtooth harrow	Apr. 21-May 7	1	0.18	0.17	0.27	0.57
Plant	Planter	May 7-May 28	1	0.55	0.30	1.29	1.00
Spray	Spray rig	May 9-May 30	1	0.28	0.25	0.26	0.41
Chop	Forage harvester	Sept. 15-Oct. 31	1				
	Corn head	Sept. 15-Oct. 31	1	7.08	2.20	11.53	9.72
Haul	Silage wagon	Sept. 15-Oct. 31	1		2.20	1.61	
Store	Forage blower	Sept. 15-Oct. 31	1		0.47	0.61	0.76
Total				9.75	6.97	19.45	18.56
<u>Soil Group 6</u>							
Plough	Moldboard plow	Nov. 1-Nov. 30	0.33	0.46	0.38	1.10	1.69
Fertilize	Custom						
Plow	Moldboard plow	Apr. 15-May 7	0.67	0.93	0.78	2.24	3.44
Disk	Disk harrow	Apr. 21-May 7	1	0.27	0.22	0.56	0.97
Harrow	Springtooth harrow	Apr. 28-May 14	1	0.18	0.17	0.27	0.57
Plant	Planter	May 15-June 7	1	0.55	0.30	1.29	1.00
Spray	Spray rig	May 16-June 8	1	0.28	0.25	0.26	0.41
Chop	Forage harvester	Sept. 8-Oct. 14	1				
	Corn head	Sept. 8-Oct. 14	1	6.91	2.20	11.53	9.72
Haul	Silage wagon	Sept. 8-Oct. 14	1		2.20	1.61	
Store	Forage blower	Sept. 8-Oct. 14	1		0.35	0.45	0.57
Total				9.57	6.85	19.30	18.36

Table 25. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF CORN SILAGE ON LP FARMS

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
						\$/ac	\$/ac
<u>Soil Group 3</u>							
Plow	Moldboard	Nov. 1-Nov. 30	0.33	0.24	0.20	0.82	1.48
Fertilize	Custom						
Plow	Moldboard plow	Apr. 1-Apr. 30	0.67	0.49	0.41	1.67	3.01
Disk	Disk harrow	Apr. 14-Apr. 30	1	0.24	0.20	0.74	1.47
Harrow	Springtooth harrow	Apr. 21-May 7	1	0.16	0.15	0.20	0.50
Plant	Planter	May 7-May 28	1	0.55	0.30	1.42	1.00
Spray	Spray rig	May 9-May 30	1	0.18	0.16	0.21	0.36
Chop	Forage harvester	Sept. 15-Oct. 31	1				
	Corn head	Sept. 15-Oct. 31	1	3.88	1.10	8.39	8.11
Haul	Silage wagon	Sept. 15-Oct. 31	1		1.10	1.12	
Store	Forage blower	Sept. 15-Oct. 31	1		0.47	0.69	0.87
Total				5.74	4.09	15.26	16.80
<u>Soil Group 6</u>							
Plough	Moldboard plow	Nov. 1-Nov. 30	0.33	0.24	0.20	0.82	1.48
Fertilize	Custom						
Plow	Moldboard plow	Apr. 15-May 7	0.67	0.49	0.41	1.67	3.01
Disk	Disk harrow	Apr. 21-May 7	1	0.24	0.20	0.74	1.47
Harrow	Springtooth harrow	Apr. 28-May 14	1	0.16	0.15	0.20	0.50
Plant	Planter	May 15-June 7	1	0.55	0.30	1.42	1.00
Spray	Spray rig	May 16-June 8	1	0.18	0.16	0.21	0.36
Chop	Forage harvester	Sept. 8-Oct. 14	1				
	Corn head	Sept. 8-Oct. 14	1	3.71	1.10	8.39	8.11
Haul	Silage wagon	Sept. 8-Oct. 14	1		1.10	1.12	
Store	Forage blower	Sept. 8-Oct. 14	1		0.35	0.51	0.65
Total				5.57	3.97	15.08	16.58

Table 26. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF ALFALFA-TIMOTHY ON SOIL GROUP THREE ON SB FARMS

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M \$/ac	Fuel & Oil \$/ac
Establishment Year							
Plow	Moldboard plow	Nov. 1-Nov. 30	0.33	0.46	0.38	1.10	1.69
Spread lime	Custom						
Fertilize	Custom						
Plow	Moldboard plow	Apr. 1-May 31	0.67	0.93	0.78	2.24	3.44
Disk	Disk harrow	Apr. 15-May 31	1	0.27	0.22	0.56	0.97
Harrow	Springtooth harrow	May 15-June 7	1	0.18	0.17	0.27	0.57
Spray	Spray rig	May 16-June 15	1	0.28	0.25	0.26	0.41
Plant	Cultipacker	May 16-June 15	1	0.47	0.26	0.39	0.58
Cut 1	Mower conditioner	Aug. 7-Aug. 27	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	Aug. 8-Aug. 28	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	Aug. 9-Aug. 30	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	Aug. 9-Aug. 30	1		0.30	0.26	0.49
Total				4.93	3.60	8.42	11.77

Table 26 (Continued)

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M \$/ac	Fuel & Oil
<u>HCS/Hay</u>							
<u>(Years 2 & 3)</u>							
Cut 1	Mower conditioner	June 1-June 14	1	0.45	0.34	1.21	1.13
Chop	Forage harvester	June 2-June 15	1	0.67	0.61	3.10	2.70
	Forage head	June 2-June 15	1	0.42	0.38	0.28	
Haul	Silage wagon	June 2-June 15	1	0.52	0.13	0.17	0.21
Storage	Storage blower	June 2-June 15	1				
Top dress	Custom						
Cut 2	Mower conditioner	July 7-July 30	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	July 8-July 31	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	July 8-July 31	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	July 8-July 31	1		0.30	0.26	0.49
Cut 3	Mower conditioner	Aug. 24-Sept. 14	0.5	0.23	0.17	0.61	0.57
Rake	Side delivery rake	Aug. 25-Sept. 15	0.5	0.19	0.15	0.17	0.23
Bale and haul	Baler	Aug. 25-Sept. 15	0.5	0.75	0.31	0.90	1.02
	Hay wagons (2)	Aug. 25-Sept. 15	0.5		0.15	0.13	0.24
Total				5.57	3.77	10.16	10.21
<u>HCS/Hay</u>							
<u>(Years 4 & 5)</u>							
Cut 1	Mower conditioner	June 14-July 14	1	0.45	0.34	1.21	1.13
Chop	Forage harvester	June 15-July 15	1	0.67	0.61	3.10	2.70
	Forage head	June 15-July 15	1	0.42	0.38	0.28	
Haul	Silage wagon	June 15-July 15	1	0.52	0.16	0.20	0.26
Storage	Storage blower	June 15-July 15	1				
Top dress	Custom						
Cut 2	Mower conditioner	Aug. 7-Aug. 24	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	Aug. 8-Aug. 25	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	Aug. 8-Aug. 25	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	Aug. 8-Aug. 25	1		0.30	0.26	0.49
Total				4.40	3.03	8.39	8.20

Table 26 (continued)

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
						\$/ac	\$/ac
Hay							
<u>(Years 2 & 3)</u>							
Out 1	Mower conditioner	June 1-June 14	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	June 2-June 15	1	0.32	0.29	0.34	0.47
Bale and haul	Baler	June 2-June 15	1	0.67	0.61	1.79	2.03
	Hay wagons (2)	June 2-June 15	1	0.52	0.30	0.26	0.49
Top dress	Custom	July 7-July 30	1	0.45	0.34	1.21	1.13
Out 2	Mower conditioner	July 8-July 31	1	0.39	0.29	0.34	0.47
Rake	Side delivery rake	July 8-July 31	1	1.50	0.61	1.79	2.03
Bale and haul	Baler	July 8-July 31	1	0.23	0.30	0.26	0.49
	Hay wagons (2)	July 8-July 31	1	0.23	0.17	0.61	0.57
Out 3	Mower conditioner	Aug. 24-Sept. 14	0.5	0.19	0.15	0.17	0.23
Rake	Side delivery rake	Aug. 25-Sept. 15	0.5	0.75	0.31	0.90	1.02
Bale and haul	Baler	Aug. 25-Sept. 15	0.5	0.15	0.15	0.13	0.24
	Hay wagons (2)	Aug. 25-Sept. 15	0.5	5.48	3.85	9.01	10.30
Total							
Hay							
<u>(Years 4 & 5)</u>							
Out 1	Mower conditioner	June 14-July 14	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	June 15-July 15	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	June 15-July 15	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	June 15-July 15	1	0.45	0.30	0.26	0.49
Top dress	Custom	Aug. 7-Aug. 24	1	0.45	0.34	1.21	1.13
Out 2	Mower conditioner	Aug. 8-Aug. 25	1	0.39	0.29	0.34	0.47
Rake	Side delivery rake	Aug. 8-Aug. 25	1	1.50	0.61	1.79	2.03
Bale and haul	Baler	Aug. 8-Aug. 25	1	0.45	0.30	0.26	0.49
	Hay wagons (2)	Aug. 8-Aug. 25	1	4.68	3.08	7.21	8.24
Total							

Table 27. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF ALFALFA-TIMOTHY ON SOIL GROUP THREE ON LP FARMS

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
						\$/ac	\$/ac
Establishment							
Year							
Plow	Moldboard plow	Nov. 1-Nov. 30	0.33	0.24	0.20	0.82	1.48
Spread lime	Custom						
Fertilize	Custom						
Plow	Moldboard plow	Apr. 1-May 31	0.67	0.49	0.41	1.67	3.01
Disk	Disk harrow	Apr. 15-May 31	1	0.24	0.20	0.74	1.47
Harrow	Springtooth harrow	May 15-June 7	1	0.16	0.15	0.20	0.50
Spray	Spray rig	May 16-June 15	1	0.18	0.16	0.21	0.36
Plant	Cultipacker	May 16-June 15	1	0.47	0.26	0.28	0.48
Cut 1	Mower conditioner	Aug. 7-Aug. 27	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	Aug. 8-Aug. 28	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	Aug. 9-Aug. 30	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	Aug. 9-Aug. 30	1		0.30	0.36	0.67
Total				3.66	2.61	7.78	11.76

Table 27 (Continued)

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M \$/ac	Fuel & Oil \$/ac
HCS/Hay (Years 2 & 3)							
Cut 1	Mower conditioner	June 1-June 14	1	0.33	0.25	1.18	0.83
Chop	Forage harvester	June 2-June 15	1				
	Forage head	June 2-June 15	1	0.51	0.46	3.43	3.39
Haul	Silage wagon	June 2-June 15	1	0.42	0.38	0.39	
Storage	Storage blower	June 2-June 15	1	0.52	0.13	0.19	0.24
Top dress	Custom		1				
Cut 2	Mower conditioner	July 7-July 30	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	July 8-July 31	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	July 8-July 31	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	July 8-July 31	1		0.30	0.36	0.67
Cut 3	Mower conditioner	Aug. 24-Sept. 14	0.5	0.17	0.13	0.59	0.42
Rake	Side delivery rake	Aug. 25-Sept. 15	0.5	0.15	0.11	0.14	0.20
Bale and haul	Baler	Aug. 25-Sept. 15	0.5	0.63	0.23	1.02	1.27
	Hay wagons (2)	Aug. 25-Sept. 15	0.5		0.15	0.18	0.33
Total				4.60	3.06	10.98	11.14
HCS/Hay (Years 4 & 5)							
Cut 1	Mower conditioner	June 14-July 14	1	0.33	0.25	1.18	0.83
Chop	Forage harvester	June 15-July 15	1				
	Forage head	June 15-July 15	1	0.51	0.46	3.43	3.39
Haul	Silage wagon	June 15-July 15	1	0.42	0.38	0.39	
Storage	Storage blower	June 15-July 15	1	0.52	0.16	0.23	0.29
Top dress	Custom		1				
Cut 2	Mower conditioner	Aug. 7-Aug. 24	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	Aug. 8-Aug. 25	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	Aug. 8-Aug. 25	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	Aug. 8-Aug. 25	1		0.30	0.36	0.67
Total				3.66	2.48	9.09	8.97

Table 27 (Continued)

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
						\$/ac	\$/ac
<u>Hay</u>							
<u>(Years 2 & 3)</u>							
Cut 1	Mower conditioner	June 1-June 14	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	June 2-June 15	1	0.24	0.22	0.29	0.41
Bale and haul	Baler	June 2-June 15	1	0.51	0.46	2.04	2.55
	Hay wagons (2)	June 2-June 15	1	0.52	0.30	0.36	0.67
	Custom		1				
Top dress	Mower conditioner	July 7-July 30	1	0.33	0.25	1.18	0.83
Cut 2	Side delivery rake	July 8-July 31	1	0.29	0.22	0.29	0.41
Rake	Baler	July 8-July 31	1	1.25	0.46	2.04	2.55
Bale and haul	Hay wagons (2)	July 8-July 31	1	0.17	0.30	0.36	0.67
	Mower conditioner	Aug. 24-Sept. 14	0.5	0.15	0.13	0.59	0.42
Cut 3	Side delivery rake	Aug. 25-Sept. 15	0.5	0.15	0.11	0.14	0.20
Rake	Baler	Aug. 25-Sept. 15	0.5	0.63	0.23	1.02	1.27
Bale and haul	Hay wagons (2)	Aug. 25-Sept. 15	0.5	0.15	0.15	0.18	0.33
Total				4.42	3.08	9.66	11.14
<u>Hay</u>							
<u>(Years 4 & 5)</u>							
Cut 1	Mower conditioner	June 14-July 14	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	June 15-July 15	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	June 15-July 15	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	June 15-July 15	1	0.33	0.30	0.36	0.67
	Custom		1				
Top dress	Mower conditioner	Aug. 7-Aug. 24	1	0.33	0.25	1.18	0.83
Cut 2	Side delivery rake	Aug. 8-Aug. 25	1	0.29	0.22	0.29	0.41
Rake	Baler	Aug. 8-Aug. 25	1	1.25	0.46	2.04	2.55
Bale and haul	Hay wagons (2)	Aug. 8-Aug. 25	1	0.33	0.30	0.36	0.67
Total				3.76	2.46	7.73	8.91

Table 28. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF TREFOIL-ALFALFA-TIMOTHY ON SOIL GROUP SIX ON SB FARMS

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
						\$/ac	\$/ac
Establishment							
Year							
Plow	Moldboard plow	Nov. 1-Nov. 30	0.33	0.46	0.38	1.10	1.69
Spread lime	Custom						
Fertilize	Custom						
Plow	Moldboard plow	Apr. 15-May 31	0.67	0.93	0.78	2.24	3.44
Disk	Disk harrow	Apr. 24-May 31	1	0.27	0.22	0.56	0.97
Harrow	Springtooth harrow	June 1-June 29	1	0.18	0.17	0.27	0.57
Spray	Spray rig	June 2-June 30	1	0.28	0.25	0.26	0.41
Plant	Cultipacker	June 2-June 30	1	0.47	0.26	0.39	0.58
Cut 1	Mower conditioner	Aug. 15-Aug. 27	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	Aug. 16-Aug. 28	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	Aug. 17-Aug. 30	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	Aug. 17-Aug. 30	1		0.30	0.26	0.49
Total				4.93	3.60	8.42	11.77

Table 28 (Continued)

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M \$/ac	Fuel & Oil \$/ac
Hay (Years 2, 3 & 4)							
Cut 1	Mower conditioner	June 14-July 14	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	June 15-July 15	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	June 15-July 15	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	June 15-July 15	1		0.30	0.26	0.49
Top dress	Custom		1				
Cut 2	Mower conditioner	Aug. 7-Aug. 24	1	0.45	0.34	1.21	1.13
Rake	Side delivery rake	Aug. 8-Aug. 25	1	0.39	0.29	0.34	0.47
Bale and haul	Baler	Aug. 8-Aug. 25	1	1.50	0.61	1.79	2.03
	Hay wagons (2)	Aug. 8-Aug. 25	1		0.30	0.26	0.49
Total				2.34	1.54	3.60	4.12
Hay (Years 5, 6 & 7)							
Cut 1	Mower conditioner	July 15-July 30	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	July 16-July 31	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	July 16-July 31	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	July 16-July 31	1		0.30	0.36	0.67
Total				1.88	1.23	3.86	4.46

Table 29. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF TREFOIL-ALFALFA-TIMOTHY ON SOIL GROUP SIX ON LP FARMS

Establishment Year	Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
					Man	Tractor	R & M	Fuel & Oil
							\$/ac	\$/ac
	Plow	Moldboard plow	Nov. 1-Nov. 30	0.33	0.24	0.20	0.82	1.48
	Spread lime	Custom						
	Fertilize	Custom						
	Plow	Moldboard plow	Apr. 15-May 31	0.67	0.49	0.41	1.67	3.01
	Disk	Disk harrow	Apr. 24-May 31	1	0.24	0.20	0.74	1.47
	Harrow	Springtooth harrow	June 1-June 29	1	0.16	0.15	0.20	0.50
	Spray	Spray rig	June 2-June 30	1	0.18	0.16	0.21	0.36
	Plant	Cultipacker	June 2-June 30	1	0.47	0.26	0.28	0.48
	Cut 1	Mower conditioner	Aug. 15-Aug. 27	1	0.33	0.25	1.18	0.83
	Rake	Side delivery rake	Aug. 16-Aug. 28	1	0.29	0.22	0.29	0.41
	Bale and haul	Baler	Aug. 17-Aug. 30	1	1.25	0.46	2.04	2.55
		Hay wagons (2)	Aug. 17-Aug. 30	1		0.30	0.36	0.67
	Total				3.66	2.61	7.78	11.76

Table 29 (Continued)

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
						\$/ac	\$/ac
<u>Hay</u>							
<u>(Years 2, 3 & 4)</u>							
Cut 1	Mower conditioner	June 14-July 14	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	June 15-July 15	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	June 15-July 15	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	June 15-July 15	1		0.30	0.36	0.67
Top dress	Custom		1				
Cut 2	Mower conditioner	Aug. 7-Aug. 24	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	Aug. 8-Aug. 25	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	Aug. 8-Aug. 25	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	Aug. 8-Aug. 25	1		0.30	0.36	0.67
Total				3.76	2.46	7.73	8.91
<u>Hay</u>							
<u>(Years 5, 6 & 7)</u>							
Cut 1	Mower conditioner	July 15-July 30	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	July 16-July 31	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	July 16-July 31	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	July 16-July 31	1		0.30	0.36	0.67
Total				1.88	1.23	3.86	4.46

Table 30. TIMING OF OPERATIONS, TRACTOR AND LABOR HOURS AND EQUIPMENT COST PER ACRE OF RENTED STANDING HAY ON SOIL GROUP SIX FOR SB AND LP FARMS

Operation	Type of Equipment	Dates	Times Over	Hours/acre		Equipment Costs	
				Man	Tractor	R & M	Fuel & Oil
<u>SB Farms</u>							
Out 1	Mower conditioner	July 15-July 30	1	0.45	0.34	\$/ac	\$/ac
Rake	Side delivery rake	July 16-July 31	1	0.39	0.29	1.21	1.13
Bale and haul	Baler	July 16-July 31	1	1.50	0.61	0.34	0.47
	Hay wagons (2)	July 16-July 31	1		0.30	1.79	2.03
Total				2.34	1.54	0.26	0.49
						3.60	4.12
<u>LP Farms</u>							
Out 1	Mower conditioner	July 15-July 30	1	0.33	0.25	1.18	0.83
Rake	Side delivery rake	July 16-July 31	1	0.29	0.22	0.29	0.41
Bale and haul	Baler	July 16-July 31	1	1.25	0.46	2.04	2.55
	Hay wagons (2)	July 16-July 31	1		0.30	0.36	0.67
Total				1.88	1.23	3.86	4.46

Table 31. LIST PRICE AND CHARACTERISTICS OF MACHINERY COMPLEMENT
FOR SMALL TRACTOR-BUCKET FARMS

Equipment ^a	List ^b price	Years life	Hours life	Width	Field ^c efficiency	Speed
	dollars			feet	percent	m.p.h.
<u>Tractors:</u>						
60 HP diesel	21,000	10	12,000			
35 HP petrol (depreciated)	0	25	12,000			
<u>Tillage and seeding:</u>						
Moldboard plow, 3 14-inch	5,000	10	2,500	3.5	70	2.9
Disc harrow, 12-foot	6,500	10	2,500	12.0	70	4.5
Springtooth harrow, 14-foot	1,900	10	2,500	14.0	70	5.0
Corn planter, 4-row	8,900	10	1,200	10.0	55	5.0
Grass seeder -- cultipacker	3,600	10	2,500	10.0	70	4.5
Spray rig, 15-foot	2,600	10	2,500	15.0	55	4.0
<u>Harvest:</u>						
Mower conditioner, 9-foot	9,600	6	2,000	9.0	60	4.5
Side delivery rake, 9-foot	3,000	10	2,500	9.0	70	4.5
Forage harvester	10,800	6	2,000	9.0	50	3.0
Grass head, 5.5-foot	2,400	6	2,000	9.0	50	3.0
Corn head, 1-row	2,500	6	2,000	2.5	50	3.0
Baler with kicker	9,500	10	2,500	9.0	60	2.5
Forage blower	3,400	10				30t/hr
Silage wagon	8,000	6	5,000	12.0	60	3.0
Hay wagons (2)	3,200	10	5,000	12.0	65	3.5
<u>Other:</u>						
Front-end loader	1,700	10	5,000			
Manure spreader, 225 bu.	4,800	10	2,500			

Footnotes:

- Equipment complement adapted from Snyder & Lazarus, 1986, A.E. Research 86-7, and Partenheimer & Knievel, 1983.
- Prices from Snyder & Lazarus, 1986 and prices from Snyder, 1987, deflated using indices from New York Economic Handbook, 1988, A.E. Extension 87-32.
- Adjusted from Lazarus, W.F. "Crop Decision Analysis with Machine Calculations," Cornell University, New York, A.E. Extension 86-39, December 1986, and American Society of Agricultural Engineers, Agricultural Engineers Yearbook, St. Joseph, Michigan, 1975, pp. 347-54. Lower levels used because of conditions found in these regions of New York State.

Table 32. LIST PRICE AND CHARACTERISTICS OF MACHINERY COMPLEMENT
FOR LARGE TRACTOR-PIPELINE FARMS

Equipment ^a	List ^b price	Years life	Hours life	Width	Field ^c efficiency	Speed
	dollars			feet	percent	m.p.h.
<u>Tractors:</u>						
100 HP diesel	40,000	10	12,000			
60 HP diesel	21,000	10	12,000			
40 HP petrol (depreciated)	0	25	12,000			
<u>Tillage and seeding:</u>						
Moldboard plow, 4 16-inch	6,200	10	2,500	6.7	70	2.9
Disc harrow, 13-foot	7,000	10	2,500	13.0	70	4.5
Springtooth harrow, 16-foot	2,200	10	2,500	16.0	70	5.0
Corn planter, 4-row	8,900	10	1,200	10.0	55	5.0
Grass seeder -- cultipacker	3,600	10	2,500	10.0	70	4.5
Spray rig, 24-foot	3,150	10	2,500	24.0	55	4.0
<u>Harvest:</u>						
Mower conditioner, 12-foot	14,500	6	2,000	12.0	60	4.5
Side delivery rake, 12-foot	3,500	10	2,500	12.0	70	4.5
Forage harvester	13,150	6	2,000	12.0	50	3.0
Grass head, 7.5-foot	3,800	6	2,000	12.0	50	3.0
Corn head, 2-row	4,100	6	2,000	5.0	50	3.0
Baler with kicker	12,000	10	2,500	12.0	60	2.5
Forage blower	3,400	10				30t/hr
Silage wagon	9,000	6	5,000	12.0	60	3.0
Hay wagons (2)	4,600	10	5,000	12.0	65	3.5
<u>Other:</u>						
Front-end loader	1,700	10	5,000			
Manure spreader, 225 bu.	6,000	10	2,500			

Footnotes:

- Equipment complement adapted from Snyder & Lazarus, 1986, A.E. Research 86-7, and Partenheimer & Knievel, 1983.
- Prices from Snyder & Lazarus, 1986 and prices from Snyder, 1987, deflated using indices from New York Economic Handbook, 1988, A.E. Extension 87-32.
- Adjusted from Lazarus, W.F. "Crop Decision Analysis with Machine Calculations," Cornell University, New York, A.E. Extension 86-39, December 1986, and American Society of Agricultural Engineers, Agricultural Engineers Yearbook, St. Joseph, Michigan, 1975, pp. 347-54. Lower levels used because of conditions found in these regions of New York State.

PART III

Estimates of Cow and Heifer Nutrient Requirements

Table 33. MAXIMUM DRY MATTER INTAKE FOR COWS AND HEIFERS

Group ID	Sales level	Average daily production	Daily DM limit	Days in group	Annual* Maximum DM
	<u>lbs/yr</u>	<u>lbs/day</u>	<u>lbs/day</u>		<u>lbs/yr</u>
<u>SB Farm</u>					
Cow 107 High	10,750	45	36.2	112	3,737
Cow 107 Medium	10,750	37	33.9	112	3,496
Cow 107 Low	10,750	24	30.1	112	3,108
Cow 117 High	11,750	49	37.4	112	3,862
Cow 117 Medium	11,750	40	34.9	112	3,599
Cow 117 Low	11,750	26	30.8	112	3,175
Cow 127 High	12,750	53	38.6	112	3,988
Cow 127 Medium	12,750	44	35.9	112	3,703
Cow 127 Low	12,750	28	31.4	112	3,242
Cow 185 High	18,500	77	45.6	112	4,709
Cow 185 Medium	18,500	63	41.6	112	4,296
Cow 185 Low	18,500	41	35.1	112	3,627
<u>LP Farm</u>					
Cow 140 High	14,000	58	40.1	112	4,144
Cow 140 Medium	14,000	48	37.1	112	3,832
Cow 140 Low	14,000	31	32.2	112	3,326
Cow 150 High	15,000	63	41.4	112	4,270
Cow 150 Medium	15,000	51	38.1	112	3,935
Cow 150 Low	15,000	33	32.9	112	3,393
Cow 160 High	16,000	67	42.6	112	4,395
Cow 160 Medium	16,000	55	39.1	112	4,038
Cow 160 Low	16,000	36	33.5	112	3,460
Cow 180 High	18,000	75	45.0	112	4,647
Cow 180 Medium	18,000	62	41.1	112	4,244
Cow 180 Low	18,000	40	34.8	112	3,594
<u>SB and LP Farm</u>					
Dry	NA	NA	25.0	60	1,383
Heifer 3-12	NA	NA	7.5	274	822
Heifer 12-30	NA	NA	16.5	548	3,617

* Multiplied by a factor of 365/396 for cows and by 1/2.5 for heifers to reduce to annual requirements.

Sources: Average daily production levels using Wood, 1979 and 1980. Formulas for dry matter, Milligan, et. al., 1981.

Minimum Net Energy Requirements for Cows and Heifers

Formulas used in calculating daily net energy requirements for cows in Mcals per cow:

Lactating cows with sales of 10,750 pounds per year for SB farms and 14,000 pounds per year for LP farms:

$$NE = GTH ((2.1 + 0.58BW) + 0.34(0.4DP + 15BF))$$

Cows with sales at higher levels: adjusted because feed is not changed for increased production:

$$\text{Adjusted NE} = NE / (1 - (\text{Change in MI} \times DF))$$

Dry Cows: $GTH(2.77 + 0.74BW)$

Source: Milligan, et. al., 1981.

Table 34. CALCULATION OF NET ENERGY REQUIREMENTS FOR HEIFERS FROM 3 TO 30 MONTHS IN Mcals PER HEIFER

	Unit	Per day		Total	
		3-9 months	9-24 months	274 days	548 days
Weight beginning	lbs.	--	--	200	550
Weight end	lbs.	--	--	550	1,100
Average weight	lbs.	--	--	375	825
Gain	lbs.	1.3	1.0	350	550
NEm requirements	Mcal.	3.62	6.57	992	3,600
NEg requirements	Mcal.	1.68	1.71	460	937
Total NE	Mcal.	5.30	8.28	1,452	4,538

Source: Net energy requirements, National Research Council, 1978.

Abbreviations used in equations:

BF = Daily butterfat in lbs.	BW = Body weight in cwt.
DP = Daily production in lbs.	GTH = Adjustment for growth.
NE = Net energy in Mcals.	NEm = Net energy maintenance in Mcals.
NEg = Net energy gain in Mcals.	MI = Maintenance increment.
DF = Discount factor.	

Table 34 (Continued).

ANNUAL NET ENERGY REQUIREMENTS
IN MCALS PER ANIMAL

Group ID	Daily requirement	Maintenance increment	Discount factor	Total requirement	Days in group	Annual* requirement
	<u>mcals/day</u>		<u>Percent</u>	<u>mcals/day</u>		<u>mcals/year</u>
<u>SB Farm</u>						
Cow 107 High	25.59	1.74	4	25.59	112	2,642
Cow 107 Medium	22.82	1.44	4	22.82	112	2,356
Cow 107 Low	18.33	0.96	4	18.33	112	1,892
Cow 117 High	27.04	1.89	4	27.21	112	2,809
Cow 117 Medium	24.01	1.57	4	24.13	112	2,491
Cow 117 Low	19.10	1.04	4	19.17	112	1,979
Cow 127 High	28.50	2.05	4	28.85	112	2,979
Cow 127 Medium	25.20	1.70	4	25.46	112	2,629
Cow 127 Low	19.88	1.13	4	20.01	112	2,066
Cow 185 High	36.83	2.94	4	38.69	112	3,995
Cow 185 Medium	32.06	2.43	4	33.38	112	3,446
Cow 185 Low	24.33	1.60	4	24.97	112	2,578
<u>LP Farm</u>						
Cow 140 High	30.31	2.24	4	30.31	112	3,129
Cow 140 Medium	26.69	1.85	4	26.69	112	2,756
Cow 140 Low	20.85	1.23	4	20.85	112	2,152
Cow 150 High	31.76	2.40	4	31.96	112	3,299
Cow 150 Medium	27.88	1.98	4	28.03	112	2,893
Cow 150 Low	21.62	1.31	4	21.69	112	2,239
Cow 160 High	33.21	2.55	4	33.63	112	3,471
Cow 160 Medium	29.08	2.11	4	29.38	112	3,033
Cow 160 Low	22.40	1.40	4	22.55	112	2,327
Cow 180 High	36.11	2.86	4	37.03	112	3,822
Cow 180 Medium	31.46	2.36	4	32.12	112	3,315
Cow 180 Low	23.95	1.56	4	24.27	112	2,505
<u>SB and LP Farms</u>						
Dry	12.86	0.38	NA	12.9	60	711
Heifer 3-12	1.68	0.46	NA	5.3	274	581
Heifer 12-30	1.71	0.26	NA	8.3	548	1,815

* Multiplied by a factor of 365/396 for cows and by 1/2.5 for heifers to reduce to annual requirements.

Table 35. MINIMUM ADJUSTED CRUDE PROTEIN REQUIREMENTS
FOR COWS AND HEIFERS

Group ID	Sales level	Average daily production	Butterfat	Daily requirement	Days in group	Annual* requirement
	<u>lbs/yr</u>	<u>lbs/day</u>	<u>percent</u>	<u>lbs/day</u>		<u>lbs/yr</u>
<u>SB Farm</u>						
Cow 107 High	10,750	45	3.7	5.1	112	530
Cow 107 Medium	10,750	37	3.7	4.4	112	457
Cow 107 Low	10,750	24	3.7	3.3	112	338
Cow 117 High	11,750	49	3.7	5.5	112	568
Cow 117 Medium	11,750	40	3.7	4.7	112	488
Cow 117 Low	11,750	26	3.7	3.5	112	359
Cow 127 High	12,750	53	3.7	5.9	112	607
Cow 127 Medium	12,750	44	3.7	5.0	112	520
Cow 127 Low	12,750	28	3.7	3.7	112	379
Cow 185 High	18,500	77	3.7	8.0	112	827
Cow 185 Medium	18,500	63	3.7	6.8	112	701
Cow 185 Low	18,500	41	3.7	4.8	112	497
<u>LP Farm</u>						
Cow 140 High	14,000	58	3.7	6.3	112	655
Cow 140 Medium	14,000	48	3.7	5.4	112	559
Cow 140 Low	14,000	31	3.7	3.9	112	405
Cow 150 High	15,000	63	3.7	6.7	112	693
Cow 150 Medium	15,000	51	3.7	5.7	112	591
Cow 150 Low	15,000	33	3.7	4.1	112	425
Cow 160 High	16,000	67	3.7	7.1	112	731
Cow 160 Medium	16,000	55	3.7	6.0	112	622
Cow 160 Low	16,000	36	3.7	4.3	112	446
Cow 180 High	18,000	75	3.7	7.8	112	808
Cow 180 Medium	18,000	62	3.7	6.6	112	685
Cow 180 Low	18,000	40	3.7	4.7	112	486
<u>SB and LP Farms</u>						
Dry	NA	NA	NA	2.1	60	115
Heifer 3-12	NA	NA	NA	1.3	274	142
Heifer 12-30	NA	NA	NA	1.8	548	390

Source: Milligan, et. al., 1981.

Heifers: Levels from National Research Council, 1978.

Formulas used in calculating crude protein requirements:

Lactating cows: $CP = GIH(0.32 + 0.06 \times BW) + 0.087(0.4 \times DP + 15 \times BF)$

Dry cows: $CP = GIH(0.56 + 0.11 \times BW)$

PART IV

Losses of Farm Produced and Purchased Feeds
Nutrient Content of Farm Produced and Purchased Feeds

Table 36.

HARVEST, STORAGE, AND FEEDING LOSSES
OF FARM PRODUCED AND PURCHASED FEEDS

Feed	Harvest	Storage	Feeding
	(Percent of standing yield)	(Percent of stored material)	(Percent of material removed from storage)
<u>Farm-produced feeds</u>			
Legume HCS	5	16	7
Legume hay	21	4	8
Grass hay	21	4	8
Corn silage	5	12	7
Grazed pasture	25		
<u>Purchased feeds</u>			
Legume hay		4	8
Grass hay		4	8
Corn grain		1	5
Soybean meal		1	5

Sources: Harvest losses from Partenheimer and Knievel, 1983.
 Grazed pasture losses from Cornell Recommends for Field Crops, 1988.
 Storage losses from P. McDonald, 1981.
 Feeding losses from Ramsey, 1983, p. 21 and Johnson, 1986, p. 158.

Table 37. NUTRIENT CONTENT OF FEEDS FOR LARGE TRACTOR-PIPELINE FARMS

Feed	Units feed	Dry matter	Energy				Heifer1	Heifer2	Crude protein	Adjusted ADF	Dry matter	
			High	Medium	Low	Dry						
			Mcal per unit of feed as fed				lbs. per unit of feed					
			percent									
Purchased corn grain	cwt.	89	83.2	84.4	86.2	88.8	71.5	74.6	8.90	0.45	89	
Purchased soybean meal	cwt.	90	73.3	75.0	77.6	81.2	65.5	63.7	44.01	1.80	90	
Purchased hay, alf-tim	ton	87	1,029	1,044	1,069	1,102	907	938	301	590	1,740	
Purchased hay, tre-tim	ton	87	873	888	912	945	785	846	237	705	1,740	
Corn silage	ton	33	459	470	487	511	415	433	56	165	660	
Alfalfa-timothy silage1	ton	40	502	509	521	537	441	469	127	251	800	
Alfalfa-timothy hay1	ton	87	1,029	1,044	1,069	1,102	907	963	301	530	1,740	
Alfalfa-timothy silage2	ton	40	449	456	466	481	397	423	111	293	800	
Alfalfa-timothy hay2	ton	87	884	897	918	946	787	843	244	705	1,740	
Trefoil-timothy hay1	ton	87	873	888	912	945	785	846	237	705	1,740	
Trefoil-timothy hay2	ton	87	831	845	868	899	750	810	179	793	1,740	
Grass hay	ton	88	779	804	844	899	746	803	139	803	1,760	
Grazed pasture	ton	28	356	356	374	398	324	343	83	185	569	

Source: Van Soest, et. al., 1979.

Formulas used in calculating net energy of feed as fed for cows:

$NE(Mcal/lb. DM) = NEI(1M) \times (1-MI)DF$

$NE(Mcal/lb. feed as fed) = NE(Mcal/lb. DM) \times lbs. per unit of feed as fed \times percent DM$

Formulas used in calculating net energy of feed as fed for cows:

Using 1M net energy figures from cows

Calculation of $TN(1M)$: $TN = [(NEI(1M)2.20462) + .12]/.0266$

Calculation of $NEM(1.5M)$: $NEM = [(TN - .5 \times DF \times TN) \times .0207 + .2] \times .453593$

Calculation of $NEG(1.5M)$: $NEG = [(TN - .5 \times DF \times TN) \times .0207 - .5] \times .453593$

Calculation of net energy of feed for heifers: $CI \times NEM + C2 \times NEG$; where CI is the proportion of total energy required for maintenance and C2 is the proportion required for gain.

For heifers 3 to 9 months of age: $CI = .68$ and $C2 = .32$.

For heifers 9 to 24 months of age: $CI = .79$ and $C2 = .21$.

Abbreviations used in equations:

NE = Net energy in Mcals.

NEG = Net energy gain in Mcals.

MI = Maintenance increment.

NEI = Net energy lactation in Mcals.

DM = Dry matter.

DF = Discount factor.

NEM = Net energy maintenance in Mcals.

TN = Total digestible nutrients.

1M = 1.0 maintenance.

Table 37 (Continued). NUTRIENT CONTENT OF FEEDS FOR SMALL TRACTOR-BUCKET FARMS

Feed	Units feed	Dry matter percent	Energy				Heifer1	Heifer2	Crude protein	Adjusted ADF	Dry matter		
			High	Medium	Low	Dry							
												lbs. per unit of feed	
Purchased corn grain	cwt.	89	84.7	85.6	87.0	88.8	71.5	74.6	8.90	0.45	89		
Purchased soybean meal	cwt.	90	75.5	76.7	78.7	81.2	65.5	68.7	44.01	1.80	90		
Purchased hay, alf-tim	ton	87	1,049	1,060	1,079	1,102	907	969	301	590	1,740		
Purchased hay, tre-tim	ton	87	892	904	922	945	735	845	237	705	1,740		
Corn silage	ton	33	473	482	495	511	415	438	56	185	660		
Alfalfa-timothy silage1	ton	40	511	517	526	537	441	469	127	251	800		
Alfalfa-timothy hay1	ton	87	1,049	1,060	1,079	1,102	907	968	301	590	1,740		
Alfalfa-timothy silage2	ton	40	458	463	471	481	397	425	111	293	800		
Alfalfa-timothy hay2	ton	87	901	911	927	946	787	848	244	705	1,740		
Trefoil-timothy hay1	ton	87	892	904	922	945	735	845	237	705	1,740		
Trefoil-timothy hay2	ton	87	849	860	878	899	750	810	179	793	1,740		
Grass hay	ton	88	811	830	861	899	746	803	139	803	1,760		
Grazed pasture	ton	28	356	368	381	398	304	343	83	185	560		

Table 38. NUTRIENT CONTENT OF FORAGES
AT EARLIER HARVEST DATES
Nutrient Content of Forages as Percentage of Dry Matter

Feed	Dry matter	Discount factor	TDN 1M	Crude protein DM	Adjusted ADF DM
			<u>percent</u>		
Alfalfa-timothy silage1	40	3.5	63	16.7	29.7
Alfalfa-timothy hay1	87	3.5	60	18.3	32.4
Alfalfa-timothy silage2	40	3.5	57	14.2	35.1
Alfalfa-timothy hay2	87	3.5	53	14.7	38.7
Trefoil-timothy silage1	40	4.0	57	13.9	35.1
Trefoil-timothy hay1	87	4.0	53	14.3	38.7
Trefoil-timothy hay2	87	4.0	49	10.9	44.2
Grass hay	88	7.0	49	8.3	44.2

Table 38 (Continued).
 NUTRIENT CONTENT OF FORAGES AT EARLIER HARVEST DATES
 Nutrient Content of Forages as Fed

Feed	Units feed	Dry matter	Energy				Crude protein	Adjusted ADF	Dry matter		
			High	Medium	Low	Dry				Half-ferl	Heifer-2
			Mcal per unit of feed as fed				lbs. per unit of feed				
percent			High	Medium	Low	Dry	Half-ferl	Heifer-2	Crude protein	Adjusted ADF	Dry matter
SB Farms											
Alfalfa-timothy silage1	ton	40	527	533	543	554	454	482	134	236	800
Alfalfa-timothy hay1	ton	87	1,094	1,106	1,126	1,149	944	1,005	318	564	1,740
Alfalfa-timothy silage2	ton	40	475	480	489	499	411	439	114	281	800
Alfalfa-timothy hay2	ton	87	950	961	978	998	827	838	256	673	1,740
Trefoil-timothy silage1	ton	40	470	477	486	498	410	439	111	231	800
Trefoil-timothy hay1	ton	87	941	953	973	996	825	886	249	673	1,740
Trefoil-timothy hay2	ton	87	869	880	898	920	766	826	190	769	1,740
Grass hay	ton	88	830	850	881	920	762	824	146	778	1,760
LP Farms											
Alfalfa-timothy silage1	ton	40	518	525	537	554	454	482	134	250	800
Alfalfa-timothy hay1	ton	87	1,074	1,090	1,115	1,149	944	1,005	318	564	1,740
Alfalfa-timothy silage2	ton	40	466	473	484	499	411	439	114	281	800
Alfalfa-timothy hay2	ton	87	932	946	968	998	827	838	256	673	1,740
Trefoil-timothy silage1	ton	40	460	468	481	498	410	438	111	281	800
Trefoil-timothy hay1	ton	87	921	937	962	996	825	886	249	673	1,740
Trefoil-timothy hay2	ton	87	850	865	888	920	766	826	190	769	1,740
Grass hay	ton	88	797	822	863	920	762	824	146	778	1,760

PART V
Equipment and Silo Costs

Table 39. CONSTRUCTION AND ANNUAL OWNERSHIP COSTS OF SILOS*

Type capacity (t)	Concrete tower			Horizontal concrete		
	550	300	225	300	150	75
Size (ft)	22x60	18x50	16x50	10x30x50	8x20x50	8x20x25
<u>Construction cost^a</u>						
Silo	\$21,393	\$13,501	\$11,664	\$4,725	\$3,000	\$1,500
Unloader	6,925	6,550	6,325	--	--	--
Average value	14,159	10,025	8,995	2,363	1,500	750
<u>Annual costs^b</u>						
Depreciation	\$1,935	\$1,494	\$1,375	\$236	\$150	\$ 75
Insurance	212	150	135	35	23	11
Repairs	774	598	550	95	60	30
Interest	1,699	1,203	1,079	284	180	90
Total annual cost	\$4,621	\$3,445	\$3,138	\$650	\$413	\$206
Cost per ton	8.40	11.48	13.95	2.17	2.75	2.75

* These costs are used in estimating the adjustments to the fixed costs for the different types of farms and for estimating the annual ownership costs of extra storage.

Footnotes:

- a. Size of silos required estimated from storage requirements based on Midwest Plan Service (1985). Construction costs adjusted from Boeckh (1987).
- b. Depreciation straight line over 20 years for silos and 8 years for unloaders assuming zero salvage value. Insurance 1.5 percent on average value. Repairs 2 percent for silos and 5 percent for unloaders on purchase price (Hoglund, 1976). Interest 12 percent on average value.

Table 40.

ESTIMATED EQUIPMENT AND OWNERSHIP COSTS FOR SMALL TRACTOR-BUCKET FEM

Item	List price	Years life	Salvage rate	Average value	CSH Farm			ALH Farm		
					Annual depreciation	Annual insurance	Annual depreciation insurance	Annual depreciation	Annual depreciation insurance	Annual depreciation insurance
	dollars		percent	dollars	dollars	dollars	dollars	dollars	dollars	dollars
Tractors										
60 HP diesel	21,000	10	20	12,600	1,680	189	1,630	189	1,600	189
35 HP petrol (depreciated)	13,000	25	5	650	0	10	0	10	0	10
Tillage and Seeding										
Moldboard plow, 3 14-inch	5,000	10	20	3,000	400	45	400	45	400	45
Disc harrow, 12-foot	6,500	10	20	3,900	520	59	520	59	520	59
Sprangtooth harrow, 14-foot	1,900	10	20	1,140	152	17	152	17	152	17
Corn planter, 4-row	8,900	10	20	5,340	712	80	712	80	0	0
Grass seeder -- cultipacker	3,600	10	20	2,160	288	32	288	32	288	32
Spray rig, 15-foot	2,600	10	20	1,560	208	23	208	23	208	23
Harvest										
Mower conditioner, 9-foot	9,600	6	30	6,240	1,120	94	1,120	94	1,120	94
Side delivery rake, 9-foot	3,000	10	20	1,800	240	27	240	27	240	27
Forage harvester	10,800	6	30	7,020	1,260	105	1,260	105	0	0
Grass head, 5.5-foot	2,400	6	30	1,560	280	23	0	0	0	0
Corn head, 1-row	2,500	6	30	1,625	292	24	292	24	0	0
Baler with kicker	9,500	10	20	5,700	760	86	760	86	760	86
Forage blower	3,400	10	20	2,040	272	31	272	31	0	0
Silage wagon (2)	16,000	6	30	10,400	1,967	156	1,967	156	0	0
Hay wagons (2)	3,200	10	20	1,920	256	29	256	29	256	29
Other										
Front-end loader	1,700	10	20	1,020	136	15	136	15	0	0
Manure spreader, 175 bu.	4,800	10	20	2,880	384	43	384	43	384	43
Total	129,400			72,555	10,826	1,088	10,546	1,065	6,008	653

Table 41. ESTIMATED EQUIPMENT AND OWNERSHIP COSTS FOR LARGE TRACTOR-PIPELINE FARM

Item	List price dollars	Years life	Salvage rate percent	Average value dollars	CSH Farm		CH Farm	
					Annual depreciation dollars	Annual insurance dollars	Annual depreciation dollars	Annual insurance dollars
Tractors								
100 HP diesel	40,000	10	20	24,000	3,200	360	3,200	360
60 HP diesel	21,000	10	20	12,600	1,680	189	1,680	63
40 HP petrol (depreciated)	15,000	25	5	750	0	11	0	11
Tillage and Seeding								
Moldboard plow, 4 16-inch	6,200	10	20	3,720	496	55	496	56
Disc harrow, 13-foot	7,000	10	20	4,200	560	63	560	63
Springtooth harrow, 16-foot	2,200	10	20	1,320	176	20	176	20
Corn planter, 4-row	8,900	10	20	5,340	712	80	712	80
Grass seeder -- cultipacker	3,600	10	20	2,160	288	32	288	32
Spray rig, 24-foot	3,150	10	20	1,890	252	29	252	28
Harvest								
Mower conditioner, 12-foot	14,500	6	20	9,425	1,692	141	1,692	141
Side delivery rake, 12-foot	3,500	10	20	2,100	280	32	280	32
Forage harvester	13,150	6	30	8,548	1,534	128	1,534	128
Grass head, 7.5-foot	3,800	6	30	2,470	443	37	0	0
Corn head, 2-row	4,100	6	30	2,665	478	40	478	40
Baler with kicker	12,000	10	20	7,200	960	108	960	108
Forage blower	3,400	10	20	2,040	272	31	272	31
Silage wagon (2)	18,000	6	30	11,700	2,100	176	2,100	176
Hay wagons (2)	4,600	10	20	2,760	368	41	368	41
Other								
Front-end loader	1,700	10	20	1,020	136	15	136	15
Manure spreader, 225 bu.	6,000	10	20	3,600	480	54	480	54
Total	191,800			109,508	16,108	1,643	15,664	1,480

Other Agricultural Economics Extension Publications

No. 89-16	Income Tax Consequences of Farm Debt Cancellation and Bankruptcy	G. Casler
No. 89-17	Factors Affecting Profitability on Limited Resource Dairy Farms, New York, 1986	B. Stanton
No. 89-18	Staying Competitive Into the 21st Century: Issues and Challenges Facing the New York State Dairy Industry	O. Forker A. Novakovic
No. 89-19	Dairy Farm Business Summary, Eastern New York Renter Summary, 1988	L. Putnam S. Smith
No. 89-20	Managing for Success: A Workshop for Dairy Farm Managers	G. Hutt R. Milligan J. Kauffman III E. Claypoole
No. 89-21	Facilitator's Guide for PRO-DAIRY Workshops	G. Hutt R. Milligan J. Kauffman III E. Claypoole
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No. 89-23	Milk Production Records for Management Control	S. Telega G. Hutt
No. 89-24	Farm Management Planner	G. Hutt S. Telega
No. 89-25	Management Control Clinic	G. Hutt J. Kauffman III R. Milligan
No. 89-26	Cornell Cooperative Extension Farm Business Management Program Guidelines, Suggestions and Resources	S. Smith W. Knoblauch G. White