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Minnesota Crop Cost & Return Guide for 2010

by

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The report provides enterprise budgets with detailed estimates of the costs and returns expected for traditional food and feed crops (corn grain, soybeans, spring wheat, sugar beets, and alfalfa hay) as well as potential energy crops (grassland crops, hybrid poplar trees, willow trees, and corn stover). Data sources for the cost and return estimates are described below.

Food and Feed Crops

The food and feed crop budgets were developed for each of the USDA National Agricultural Statistics Service (NASS) regions and for Minnesota as a whole (see Figure 1). Yields for those crops are NASS yields averaged over the five years, 2004-08. Crop prices are based on FAPRI's mid-year baseline forecast and on futures prices for 2010 harvest-time futures contracts [Food and Agricultural Policy Research Institute, 2009] (Table 1). Government payments are based on 2009 payment rates with base yield assumed to be the same as the budget yield. The corn fertilization rates consider credits from a previous soybean crop.

Costs that vary with yield in the regional budgets are harvest and crop transportation costs and phosphorus and potash fertilizer costs. Costs that are held constant across regions are seed, nitrogen fertilizer, chemicals, and preharvest machinery. Land rent, crop insurance, and miscellaneous expenses for corn, soybeans, wheat, and alfalfa are from 2008 FINBIN county crop enterprise cost and return data collected under the MnSCU Farm Business Management Program and the Southwestern Minnesota Farm Business Farm Management Association, and then aggregated by NASS region. One year's inflation was added to those 2008 averages using the Bureau of Labor Statistics producer price index and the USDA-NASS index of prices paid by farmers. Government payments are based on rates for a representative county in each region.

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Labor hours and total labor costs are also from FINBIN county summaries. The FINBIN labor hours and cost are based on an allocation of total farm labor disappearance and usually exceed direct machinery operation labor. The difference is likely to be time spent in planning, crop marketing, and maintenance that may not be directly related to a particular crop and so this extra labor is treated as a fixed cost in the budgets.

Seeding rates and chemical applications are based on University of Minnesota Extension recommendations and/or judgments of Extension staff about typical producer practices in Minnesota. Fertilizer rates are based on 2008 FINBIN per-acre average expenses, NASS estimates of prices paid for fertilizer, Extension recommendations, and average P and K soil test levels from a commercial laboratory.

The corn and soybean seed prices are thought to be typical of a biotech hybrid, but the corn variety would not be rootworm resistant. Wheat seed prices are assumed to be \$5/bushel over the market price for wheat. Seeding rates per acre are corn - 34,000 kernels, soybeans - one bushel, and wheat - 113 pounds. Fertilizer prices are based on late summer 2009 industry estimates. Nitrogen prices are based on anhydrous ammonia (NH₃) for the annual crops (corn and sugar beets) where the NH₃ can be applied during a tillage operation. For the grassland, poplar, and willow crops that are not tilled at the time of fertilizer application, urea is assumed to be the nitrogen source. P₂O₅ prices are based on an 18-46-0 price with the N priced as NH₃. K₂O prices are based on 0-0-60. Chemical prices are estimated retail prices from a variety of sources.

Machinery costs reflect new equipment, and are based on the Machinery Cost Estimates extension publication dated July, 2008. The farm diesel fuel price is \$2.25/gallon. Fertilizer and chemicals are assumed to be custom-applied.

One intended use for the budgets is in carbon footprint studies of renewable energy production, so energy consumption and greenhouse gas emission estimates are also provided in addition to economic cost and return calculations. The energy and greenhouse gas estimates draw on factors from the GREET model [Wang]. Energy use and emissions totals were based on the production of fertilizers and crop chemicals, production and burning of fuel in transportation and farm machine operations, and production of farm machinery. Energy consumption and greenhouse gas emissions for corn drying are not identified in GREET, so these were estimated by assuming that half of the FINBIN drying cost is for fuel and electricity and the other half is for ownership costs of the dryer and for labor. The fuel and electricity costs were converted to BTUs and CO₂-equivalent emissions assuming that half of the corn is dried using propane and half with natural gas, and with fuel and electricity requirements from Wilcke [Wilcke, 2004].

Alfalfa Budgets

The alfalfa budgets are assumed to follow a four year lifecycle with an establishment year followed by three years of mature stand. Budgets were done both for alfalfa direct seeded with an establishment-

year yield half as large as the mature stand, and seeded with an oats cover crop assumed to provide two tons of oatlage in the establishment year.

Energy Crops

The energy crops were developed only for Minnesota as a whole, due to insufficient information on regional differences. Two grassland crop scenarios were developed: a higher-fertilization, higher-yield monoculture scenario with an expected ten-year stand life that might be typical of switchgrass but could be any of several other species; and a lower-fertilization, lower-yield scenario with a diverse species mix with an expected twenty-year stand life. The high-fertilization scenario is labeled as “switchgrass” and the low-fertilization scenario as “prairie” in some of the tables to save space.

The high-fertilization grassland budget is based mainly on recent data from demonstration plots in Nebraska and the Dakotas, and University of Minnesota agronomists [Sheaffer, 2008; Perrin et al.; Perrin et al., 2008]. The report assumes a 10 year stand life, consisting of 4 budget stages: A planting year 1 with no harvest, a maintenance year 2 with a two-ton dry matter yield, and harvest years 3-10 with four ton yields. A seeding rate of seven pounds per acre is used at a cost of \$3.50/lb based on a price quoted by a Minnesota native grass seed producer in October, 2008. Fertilization rates are based on University of Minnesota recommendations for pasture land.

The low-fertilization grassland budget is similar to the high-fertilization one, but seeded with a more diverse species mix of grasses, lower yield and fertilization rates, and a longer 20 year stand life. The stand life consists of a planting year 1 with no harvest, followed by three maintenance years with no yield in year 2, a one ton dry matter yield in year 3, and one and a half tons in year 4; followed by 16 years of a mature stand yielding 2 tons per year. A seeding rate of 8.5 pounds per acre at a cost of \$8.24/lb is based on a 15-species mix recommended for Conservation Reserve Program land in Minnesota. Fertilization rates are based on University of Minnesota recommendations for pasture land.

The hybrid poplar budget is based on data from the University of Minnesota foresters and consists of a 17 year lifecycle including two harvests. Planting of 681 seedlings per acre in year 1 is followed by maintenance in year 2 that includes an additional 136 seedlings. Maintenance continues for years 3-7, and then is followed by the first harvest in year 8. Maintenance continues in years 9-15 as the trees grow back from the stumps. The second harvest occurs in year 16. Maintenance operations by year are:

- Year 2 - Mow weeds, cultivate, and spray
- Year 3 - Mow weeds and cultivate
- Year 4 - Fertilize and mow weeds
- Year 5 - Nothing
- Year 6 - Fertilize
- Year 7 - Mow weeds

A yield of 32 tons per acre *per harvest* is assumed, which is equivalent to an annual yield increment of 4 tons. The harvest years require lumbering equipment, a feller-buncher and skidder. In year 17 the stumps are removed. Seedlings are assumed to cost \$0.15 each.

The willow budget, based on a limited amount of data from the Southern Research and Outreach Center at Waseca and from trials in New York State, includes some potential benefits over poplar. The Waseca planting will be harvested for the first time in the fall of 2009, so this budget will be revised as needed once that data becomes available. Willow has a 20 year lifecycle including 5 harvests, the harvests can be performed with a modified agricultural forest harvester that is faster and cheaper than the lumbering equipment, and produces a slightly higher average yield than poplar. The lifecycle includes a planting of 9,500 seedlings costing \$0.11 each in year one, followed by two maintenance years, then the first harvest in year 4. Then a cycle of two coppice years and one harvest is repeated five times. Finally in year 20 the stock is removed. Based on the New York data, an annual yield increment of 5 tons per acre is assumed, but 8 percent of the land is in headlands where the harvesting equipment turns, so that only the remaining 92 percent of the land is harvested. The plan at Waseca is to harvest every 3 years rather than 4 as in New York, so the yield per acre per harvest is 5 tons x 92% harvested x 3 years of growth, or 13.8 tons per acre per harvest.

The corn budgets with stover removal assume that the stover is shredded, raked and baled. A yield of two tons per acre of stover is assumed in the report. Additional fertilizer is required on the field when the stover is collected, with the nitrogen amounts based on Wu et al. and the phosphorus and potassium amounts based on Iowa State recommendations [Wu et al., 2006; Sawyer et al., 2002]. The budget comparison table shows the incremental costs that the stover harvest adds to the corn enterprise.

Land rents for energy crops were assumed to be less than for traditional crops as energy crops may be grown on more marginal lands that may not be suitable for traditional crops. A \$40/acre land rental rate for energy crops is used, based on the FINBIN average rent for intensive pasture. All energy crops were assumed to be sold at \$60/ton dry matter. Nitrogen fertilizer prices for energy crops and alfalfa are based on urea nitrogen fertilizer.

In the case of the corn with stover harvest, the energy usage and greenhouse gas emissions are allocated between the primary product (corn grain) and the secondary product (stover) based on their market values per acre.

List of Tables

- Table 1. Prices Used in the Crop Enterprise Budgets
- Table 2. Assumptions Made for the Energy Crop Budgets
- Table 3. Feed and Food Crop Estimated Costs and Returns, Minnesota
- Table 4. Energy Crop Estimated Costs and Returns, Minnesota
- Table 5. Corn Estimated Costs and Returns, by Region
- Table 6. Soybeans, Wheat, and Sugar Beet Estimated Costs and Returns, by Region
- Table 7. Alfalfa Hay Estimated Costs and Returns, Direct Seeded, by Region
- Table 8. Alfalfa Hay Estimated Costs and Returns by Stage, Minnesota
- Table 11. Net Returns Per Acre by Year and Net Present Value of Returns for Hybrid Poplar, Minnesota
- Table 10. Net Returns Per Acre by Year and Net Present Value of Returns for Low-Fertilization Grassland, Minnesota
- Table 9. Net Returns Per Acre by Year and Net Present Value of Returns for High-Fertilization Grassland, Minnesota
- Table 12. Net Returns Per Acre by Year and Net Present Value of Returns for Willow, Minnesota

(See the accompanying Excel spreadsheet for detailed price and quantity information, downloadable at http://www.apec.umn.edu/faculty/wlazarus/documents/Cropbud_MN2010.xls.)

Table 1. Prices Used in the Crop Enterprise Budgets

Crop Prices	
Corn	\$3.60 / bu
Soybeans	\$9.00 / bu
Wheat	\$5.00 / bu
Alfalfa	\$120.00 / ton
Poplar	\$60.00 / ton
Prairie	\$60.00 / ton
Switchgrass	\$60.00 / ton
Willow	\$60.00 / ton
Corn Stover	\$60.00 / ton
Oatlage	\$60.00 / ton
Corn silage	\$30.00 / ton
Sugar beets	\$41.00 / ton

Seeds and Seedlings				
	Quantity / Acre	Price		
Corn	34	\$250.00	/ 80	thousands
Alfalfa	15	\$379.00	/ 100	lbs
Poplar	681	\$ 0.15	/	seedling
Prairie	8.5	\$ 8.24	/	lb
Soybeans	1	\$ 40.00	/ 160	thousands
Wheat	1.9	\$ 10.50	/	bu
Switchgrass	7	\$ 3.50	/	lb
Willow	9,500	\$ 0.11	/	seedling
Sugar beets	2	\$60.00	/	lb

Fertilizer and Fuel	
Nitrogen - Anhydrous Ammonia	\$0.27 / lb
Nitrogen - Urea	\$0.41 / lb
Phosphorus	\$0.33 / lb
Potash	\$0.46 / lb
Diesel Fuel	\$2.25 / gal

Table 2. Assumptions Made for the Energy Crop Budgets

	Grassland, high fertilization	Grassland, low fertilization	Hybrid poplar	Willow
<u>Stand Life and Production Activities</u>				
Establishment period (first year - last year):	1 - 2	1- 4	0 - 7	1 - 3
Mature stand duration (first year - last year):	3 - 10	5 - 20	8- 16	4- 19
Fertilize in year:	3-10	2-19	3, 5, 9, 11	2, 5, 8, 11, 14, 17
Spray in year:	1	1	1	1-2, 5, 8, 11, 14, 17
Cultivate or mow weeds in year:			1-4, 9-11, 14-15	
Harvest in year:	2-10	2-19	8, 16	4, 7, 10, 13, 16, 19
Stump removal in year:			17	20
Overall stand life including stump removal	10 years	20 years	17 years	20 years
<u>Yields</u>				
Yield/year during mature stand, tons dry matter	4.0	2.0	4.0	4.6
Yield/year average over stand life including stump removal, tons dry matter	3.4	1.7	3.8	4.1
Moisture content (%)	10%	10%	50%	50%
Yield/year during mature stand, tons as harvested	4.4	2.2	8.0	9.2
Yield/year average over stand life including stump removal, tons as harvested	3.7	1.9	7.6	8.2
<u>Transportation of Crop to Processing</u>				
Tons/load as harvested	18	18	18	18
Tons/load dry matter	16.2	16.2	9	9
Transport distance to processing plant (highway miles)	25	25	25	25
Waiting time to load (minutes)	45	45	45	5
Waiting time to unload (minutes)	8	8	8	15
Gas mileage of trucks (miles per gallon)	8	8	8	8
Diesel fuel cost (highway use, \$/gallon)	\$2.75	\$2.75	\$2.75	\$2.75
Non-fuel expenses for truck (\$ per mile)	\$0.50	\$0.50	\$ 0.50	\$0.50
Driving Speed (miles per hour)	50	50	50	50
Labor cost/hour (total for 1 driver and 1/4 loader)	\$ 25	\$25	\$25	\$25
Total expense/mile	\$1.79	\$1.94	\$ 2.01	\$1.74
Total expense/ton dry matter	\$5.51	\$5.51	\$ 9.92	\$ 9.92

Table 3. Feed and Food Crop Estimated Costs and Returns, Minnesota

Per Acre	Corn MN	Soybeans MN	Wheat MN	Sugar beets MN	Corn silage MN	Perennial: Alfalfa - Dir » MN (4 yrs)	Perennial: Alfalfa - CC » MN (4 yrs)
Product yield	150.7 bu	39.8 bu	47.5 bu	21.0 ton	15.3 ton	3.5 ton	3.0 ton
Product price, present value equivalent	\$ 3.60	\$ 9.00	\$ 5.00	\$ 41.00	\$ 30.00	\$ 118.47	\$ 116.44
Secondary product							Oatlage
Secondary product yield							0.5 ton
Secondary product price							\$ 65.34
REVENUE							
Product revenue	\$ 543	\$ 359	\$ 238	\$ 861	\$ 459	\$ 415	\$ 349
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 33
Government payments	\$ 36	\$ 15	\$ 21	\$ -	\$ 4	\$ -	\$ -
Miscellaneous income	\$ 22	\$ 20	\$ 6	\$ 69	\$ 32	\$ 0	\$ 0
Total Revenue	\$ 601	\$ 393	\$ 265	\$ 930	\$ 495	\$ 415	\$ 382
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(140-30-50)	(0-0-0)	(115-15-35)	(100-10-0)	(140-25-40)	(0-20-45)	(0-20-45)
COSTS							
Seed	\$ 116	\$ 50	\$ 20	\$ 90	\$ 116	\$ 12	\$ 18
Fertilizer	\$ 81	\$ -	\$ 62	\$ 40	\$ 74	\$ 37	\$ 37
Crop chemicals	\$ 38	\$ 47	\$ 59	\$ 93	\$ 38	\$ 23	\$ 12
Crop insurance	\$ 28	\$ 26	\$ 27	\$ 22	\$ 28	\$ 1	\$ 1
Miscellaneous	\$ 21	\$ 16	\$ 12	\$ 126	\$ 13	\$ 20	\$ 20
Machinery w/labor	\$ 71	\$ 55	\$ 43	\$ 153	\$ 87	\$ 68	\$ 61
Crop drying	\$ 31	\$ -	\$ 2	\$ -	\$ -	\$ -	\$ -
Transport	\$ 18	\$ 5	\$ 6	\$ 11	\$ 11	\$ 2	\$ 2
Labor & Mgmt (non-machinery)	\$ 52	\$ 39	\$ 30	\$ 160	\$ 29	\$ 53	\$ 53
Rent	\$ 117	\$ 108	\$ 66	\$ 94	\$ 90	\$ 105	\$ 105
Interest on pre-harvest var. expenses	\$ 11	\$ 6	\$ 7	\$ 12	\$ 10	\$ 4	\$ 4
Total Listed Costs	\$ 582	\$ 350	\$ 335	\$ 800	\$ 498	\$ 328	\$ 315
NET RETURN	\$ 18	\$ 43	\$ (70)	\$ 130	\$ (3)	\$ 87	\$ 68
Labor & management hours	2.5	1.9	1.3	5.4	5.3	3.9	3.8
Total Energy (mmBTU)/A main product	6.01	1.00	3.65	4.08	4.34	2.41	2.24
Total Emissions (kg CO ₂ eq)/A main product	378	67	238	237	291	189	175
Total Energy (mmBTU)/A secondary prod	0.00	0.00	0.00	0.00	0.00	0.00	0.26
Total Emissions (kg CO ₂ eq)/A second prod	0	0	0	0	0	0	17

Table 3. Feed and Food Crop Estimated Costs and Returns, Minnesota (continued)

Per Unit	Corn		Soybeans		Wheat		Sugar beets		Corn silage		Perennial:	Perennial:
	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	Alfalfa - Dir » MN (4 yrs)	Alfalfa - CC » MN (4 yrs)
Product yield	150.7 bu	39.8 bu	47.5 bu	21.0 ton	15.3 ton	3.5 ton	3.0 ton					
Price, present value equivalent	\$ 3.60	\$ 9.00	\$ 5.00	\$ 41.00	\$ 30.00	\$ 118.47	\$ 116.44					
Secondary product												Oatlage
Secondary product yield												0.5 ton
Secondary product price												\$ 65.34
REVENUE												
Primary product	\$ 3.60	\$ 9.00	\$ 5.00	\$ 41.00	\$ 30.00	\$ 118.47	\$ 116.44					
Secondary product							\$ 65.34					
Government payments	\$ 0.24	\$ 0.37	\$ 0.44	\$ -	\$ 0.24	\$ -	\$ -					
Miscellaneous income	\$ 0.15	\$ 0.49	\$ 0.13	\$ 3.29	\$ 2.11	\$ 0.07	\$ 0.09					
Total Revenue	\$ 3.99	\$ 9.87	\$ 5.57	\$ 44.29	\$ 32.35	\$ 118.55	\$ 127.42					
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(140-30-50)	(0-0-0)	(115-15-35)	(100-10-0)	(140-25-40)	(0-20-45)	(0-20-45)					
COSTS												
Seed	\$ 0.77	\$ 1.26	\$ 0.42	\$ 4.29	\$ 7.60	\$ 3.54	\$ 5.90					
Fertilizer	\$ 0.54	\$ -	\$ 1.31	\$ 1.92	\$ 4.87	\$ 10.66	\$ 12.43					
Crop chemicals	\$ 0.25	\$ 1.19	\$ 1.25	\$ 4.43	\$ 2.48	\$ 6.50	\$ 3.88					
Crop insurance	\$ 0.19	\$ 0.64	\$ 0.57	\$ 1.05	\$ 1.84	\$ 0.40	\$ 0.46					
Miscellaneous	\$ 0.14	\$ 0.39	\$ 0.25	\$ 6.02	\$ 0.87	\$ 5.85	\$ 6.83					
Machinery w/labor	\$ 0.47	\$ 1.37	\$ 0.91	\$ 7.26	\$ 5.69	\$ 19.55	\$ 20.47					
Crop drying	\$ 0.21	\$ -	\$ 0.05	\$ -	\$ -	\$ -	\$ -					
Transport	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.51	\$ 0.71	\$ 0.70	\$ 0.82					
Labor & Mgmt (non-machinery)	\$ 0.34	\$ 0.98	\$ 0.63	\$ 7.62	\$ 1.88	\$ 15.04	\$ 17.54					
Rent	\$ 0.77	\$ 2.70	\$ 1.38	\$ 4.46	\$ 5.91	\$ 30.14	\$ 35.16					
Interest on pre-harvest var. expenses	\$ 0.07	\$ 0.14	\$ 0.15	\$ 0.56	\$ 0.68	\$ 1.27	\$ 1.34					
Total Listed Costs	\$ 3.86	\$ 8.79	\$ 7.05	\$ 38.11	\$ 32.53	\$ 93.64	\$ 104.85					
NET RETURN	\$ 0.12	\$ 1.08	\$ (1.48)	\$ 6.18	\$ (0.18)	\$ 24.90	\$ 22.56					
Labor & management hours	0.017	0.047	0.028	0.259	0.349	1.102	1.277					
Total Energy (mmBTU)/lb product	0.040	0.025	0.077	0.194	0.284	0.689	0.747					
Total Emissions (kg CO ₂ eq)/main product	2.51	1.69	5.01	11.30	19.00	53.93	58.46					
Total Energy (mmBTU)/lb secondary prod							0.513					
Total Emissions (kg CO ₂ eq)/lb second prod							34.78					

Table 4. Energy Crop Estimated Costs and Returns, Minnesota

Per Acre	Perennial: Switchgrass » MN (10 yrs)	Perennial: Prairie » MN (20 yrs)	Perennial: Poplar » MN (17 yrs)	Perennial: Willow » MN (20 yrs)	Corn Stover » MN vs Corn MN
Product yield	3.4 ton	1.7 ton	3.8 ton	4.1 ton	0.0 bu
Product price, present value equivalent	\$ 57.27	\$ 54.70	\$ 49.70	\$ 55.95	
Secondary product					Corn Stover
Secondary product yield					2.0 ton
Secondary product price					\$ 60.00
REVENUE					
Product revenue	\$ 195	\$ 94	\$ 187	\$ 232	\$ -
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ 120
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ 195	\$ 94	\$ 187	\$ 232	\$ 120
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(48-16-36)	(50-4-4)	(24-0-0)	(30-0-0)	(14-15-50)
COSTS					
Seed	\$ 3	\$ 6	\$ 12	\$ 86	\$ -
Fertilizer	\$ 46	\$ 29	\$ 12	\$ 16	\$ 32
Crop chemicals	\$ 3	\$ 2	\$ 5	\$ 31	\$ -
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 41	\$ 25	\$ 119	\$ 89	\$ 36
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 34	\$ 17	\$ 30	\$ 37	\$ 21
Labor & Mgmt (non-machinery)	\$ 20	\$ 20	\$ 20	\$ 20	\$ -
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ -
Interest on pre-harvest var. expenses	\$ 3	\$ 2	\$ 2	\$ 5	\$ 2
Total Listed Costs	\$ 191	\$ 140	\$ 240	\$ 324	\$ 91
NET RETURN	\$ 4	\$ (46)	\$ (52)	\$ (93)	\$ 29
Labor & management hours	1.4	1.3	3.2	1.5	0.3
Total Energy (mmBTU)/A main product	2.70	2.02	2.03	1.66	0.00
Total Emissions (kg CO ₂ eq)/A main product	207	144	172	134	0
Total Energy (mmBTU)/A secondary prod	0.00	0.00	0.00	0.00	1.61
Total Emissions (kg CO ₂ eq)/A second prod	0	0	0	0	128

Table 4. Energy Crop Estimated Costs and Returns, Minnesota (continued)

Per Unit	Perennial: Switchgrass » MN (10 yrs)	Perennial: Prairie » MN (20 yrs)	Perennial: Poplar » MN (17 yrs)	Perennial: Willow » MN (20 yrs)	Corn Stover » MN vs Corn MN
Product yield	3.4 ton	1.7 ton	3.8 ton	4.1 ton	0.0 bu
Price, present value equivalent	\$ 57.27	\$ 54.70	\$ 49.70	\$ 55.95	
Secondary product					Corn Stover
Secondary product yield					2.0 ton
Secondary product price					\$ 60.00
					/Unit of Second Prod
REVENUE					
Primary product	\$ 57.27	\$ 54.70	\$ 49.70	\$ 55.95	\$ -
Secondary product					\$ 60.00
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ 57.27	\$ 54.70	\$ 49.70	\$ 55.95	\$ 60.00
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(48-16-36)	(50-4-4)	(24-0-0)	(30-0-0)	(14-15-50)
COSTS					
Seed	\$ 0.92	\$ 3.34	\$ 3.21	\$ 20.76	\$ -
Fertilizer	\$ 13.67	\$ 16.92	\$ 3.22	\$ 3.87	\$ 15.87
Crop chemicals	\$ 0.85	\$ 1.07	\$ 1.38	\$ 7.41	\$ -
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 12.06	\$ 14.26	\$ 31.52	\$ 21.61	\$ 17.99
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 10.10	\$ 9.65	\$ 7.93	\$ 8.93	\$ 10.59
Labor & Mgmt (non-machinery)	\$ 5.88	\$ 11.59	\$ 5.31	\$ 4.83	\$ -
Rent	\$ 11.76	\$ 23.19	\$ 10.63	\$ 9.66	\$ -
Interest on pre-harvest var. expenses	\$ 0.85	\$ 1.11	\$ 0.44	\$ 1.24	\$ 1.07
Total Listed Costs	\$ 56.10	\$ 81.13	\$ 63.64	\$ 78.31	\$ 45.51
NET RETURN	\$ 1.17	\$ (26.44)	\$ (13.94)	\$ (22.36)	\$ 14.49
Labor & management hours	0.426	0.752	0.851	0.357	0.163
Total Energy (mmBTU)/lb product	0.796	1.173	0.539	0.402	
Total Emissions (kg CO ₂ eq)/main product	60.89	83.41	45.81	32.31	
Total Energy (mmBTU)/lb secondary prod					0.803
Total Emissions (kg CO ₂ eq)/lb second prod					64.17

Table 5. Corn Estimated Costs and Returns, by Region (continued)

Per Unit	Corn MN	Corn C	Corn NE	Corn NW	Corn SC	Corn SE	Corn SW	Corn WC	Corn Stover » MN	Corn Stover » SC
Product yield	150.7 bu	133.9 bu	94.5 bu	100.0 bu	172.0 bu	161.3 bu	161.8 bu	140.4 bu	150.7 bu	172.0 bu
Price, present value equivalent	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60
Secondary product									Corn Stover	Corn Stover
Secondary product yield									2.0 ton	2.0 ton
Secondary product price									\$ 60.00	\$ 60.00
REVENUE										
Primary product	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60	\$ 3.60
Secondary product									\$ 60.00	\$ 60.00
Government payments	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24	\$ 0.24
Miscellaneous income	\$ 0.15	\$ 0.14	\$ 0.44	\$ 0.09	\$ 0.12	\$ 0.15	\$ 0.07	\$ 0.20	\$ 0.15	\$ 0.12
Total Revenue	\$ 3.99	\$ 3.98	\$ 4.28	\$ 3.93	\$ 3.96	\$ 3.99	\$ 3.91	\$ 4.04	\$ 4.78	\$ 4.65
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(140-30-50)	(140-20-35)	(140-20-45)	(140-40-15)	(140-20-50)	(140-20-50)	(140-25-45)	(140-30-30)	(154-45-100)	(154-35-100)
COSTS										
Seed	\$ 0.77	\$ 0.87	\$ 1.23	\$ 1.16	\$ 0.68	\$ 0.72	\$ 0.72	\$ 0.83	\$ 0.77	\$ 0.68
Fertilizer	\$ 0.54	\$ 0.53	\$ 0.79	\$ 0.68	\$ 0.45	\$ 0.48	\$ 0.47	\$ 0.51	\$ 0.75	\$ 0.63
Crop chemicals	\$ 0.25	\$ 0.28	\$ 0.40	\$ 0.38	\$ 0.22	\$ 0.24	\$ 0.23	\$ 0.27	\$ 0.25	\$ 0.22
Crop insurance	\$ 0.19	\$ 0.23	\$ 0.24	\$ 0.31	\$ 0.16	\$ 0.17	\$ 0.14	\$ 0.20	\$ 0.19	\$ 0.16
Miscellaneous	\$ 0.14	\$ 0.18	\$ 0.15	\$ 0.16	\$ 0.13	\$ 0.15	\$ 0.13	\$ 0.13	\$ 0.14	\$ 0.13
Machinery w/labor	\$ 0.47	\$ 0.49	\$ 0.58	\$ 0.56	\$ 0.45	\$ 0.46	\$ 0.46	\$ 0.48	\$ 0.71	\$ 0.66
Crop drying	\$ 0.21	\$ 0.25	\$ 0.22	\$ 0.37	\$ 0.17	\$ 0.22	\$ 0.10	\$ 0.22	\$ 0.21	\$ 0.17
Transport	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.26	\$ 0.24
Labor & Mgmt (non-machinery)	\$ 0.34	\$ 0.41	\$ 0.57	\$ 0.50	\$ 0.30	\$ 0.35	\$ 0.31	\$ 0.33	\$ 0.34	\$ 0.30
Rent	\$ 0.77	\$ 0.90	\$ 0.32	\$ 0.71	\$ 0.91	\$ 0.93	\$ 0.82	\$ 0.70	\$ 0.77	\$ 0.91
Interest on pre-harvest var. expenses	\$ 0.07	\$ 0.08	\$ 0.11	\$ 0.10	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.07	\$ 0.08	\$ 0.07
Total Listed Costs	\$ 3.86	\$ 4.33	\$ 4.73	\$ 5.05	\$ 3.64	\$ 3.90	\$ 3.57	\$ 3.87	\$ 4.47	\$ 4.17
NET RETURN	\$ 0.12	\$ (0.35)	\$ (0.45)	\$ (1.12)	\$ 0.31	\$ 0.09	\$ 0.34	\$ 0.17	\$ 0.31	\$ 0.48
Labor & management hours	0.017	0.024	0.049	0.020	0.014	0.016	0.015	0.014	0.019	0.016
Total Energy (mmBTU)/lb product	0.040	0.044	0.055	0.058	0.035	0.038	0.034	0.042	0.041	0.037
Total Emissions (kg CO ₂ eq)/main product	2.51	2.71	3.44	3.53	2.22	2.39	2.21	2.61	2.75	2.48
Total Energy (mmBTU)/lb secondary prod									0.689	0.620
Total Emissions (kg CO ₂ eq)/lb second prod									45.84	41.41

Table 6. Soybeans, Wheat, and Sugar Beet Estimated Costs and Returns, by Region

Per Acre	Soybeans NW	Soybeans WC	Soybeans C	Soybeans SW	Soybeans SC	Soybeans SE	Wheat NW	Wheat WC	Sugar beets NW	Sugar beets WC
Product yield	27.4 bu	36.5 bu	40.2 bu	44.8 bu	47.2 bu	46.5 bu	47.6 bu	48.8 bu	21.0 ton	23.0 ton
Product price, present value equivalent	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 5.00	\$ 5.00	\$ 41.00	\$ 41.00
REVENUE										
Product revenue	\$ 246	\$ 329	\$ 362	\$ 403	\$ 425	\$ 419	\$ 238	\$ 244	\$ 861	\$ 943
Government payments	\$ 10	\$ 14	\$ 15	\$ 17	\$ 18	\$ 17	\$ 21	\$ 22	\$ -	\$ -
Miscellaneous income	\$ 20	\$ 17	\$ 16	\$ 14	\$ 18	\$ 21	\$ (1)	\$ 8	\$ 40	\$ 123
Total Revenue	\$ 276	\$ 359	\$ 393	\$ 434	\$ 461	\$ 457	\$ 258	\$ 273	\$ 901	\$ 1,066
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(0-20-0)	(0-0-0)	(0-0-0)	(0-0-0)	(0-0-0)	(0-0-0)	(115-30-15)	(115-15-25)	(100-35-0)	(100-10-0)
COSTS										
Seed	\$ 50	\$ 50	\$ 50	\$ 50	\$ 50	\$ 50	\$ 20	\$ 20	\$ 90	\$ 90
Fertilizer	\$ 7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 58	\$ 58	\$ 49	\$ 40
Crop chemicals	\$ 47	\$ 47	\$ 47	\$ 47	\$ 47	\$ 47	\$ 59	\$ 59	\$ 91	\$ 107
Crop insurance	\$ 25	\$ 23	\$ 27	\$ 25	\$ 28	\$ 31	\$ 30	\$ 21	\$ 21	\$ 22
Miscellaneous	\$ 12	\$ 15	\$ 18	\$ 16	\$ 18	\$ 19	\$ 11	\$ 13	\$ 132	\$ 76
Machinery w/labor	\$ 46	\$ 52	\$ 55	\$ 58	\$ 60	\$ 59	\$ 43	\$ 44	\$ 153	\$ 153
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1	\$ 6	\$ -	\$ -
Transport	\$ 3	\$ 4	\$ 5	\$ 5	\$ 6	\$ 5	\$ 6	\$ 6	\$ 11	\$ 12
Labor & Mgmt (non-machinery)	\$ 29	\$ 39	\$ 44	\$ 39	\$ 42	\$ 48	\$ 30	\$ 30	\$ 163	\$ 176
Rent	\$ 63	\$ 93	\$ 118	\$ 131	\$ 154	\$ 151	\$ 59	\$ 78	\$ 85	\$ 116
Interest on pre-harvest var. expenses	\$ 6	\$ 5	\$ 6	\$ 6	\$ 6	\$ 6	\$ 7	\$ 7	\$ 12	\$ 12
Total Listed Costs	\$ 288	\$ 329	\$ 370	\$ 376	\$ 410	\$ 416	\$ 326	\$ 342	\$ 805	\$ 804
NET RETURN	\$ (11)	\$ 30	\$ 23	\$ 58	\$ 51	\$ 40	\$ (68)	\$ (69)	\$ 96	\$ 261
Labor & management hours	1.3	1.8	2.3	2.0	2.0	2.1	1.3	1.4	5.6	4.7
Total Energy (mmBTU)/A main product	0.93	0.96	1.00	1.06	1.08	1.08	3.58	3.76	4.17	4.09
Total Emissions (kg CO ₂ eq)/A main product	64	64	68	72	75	74	237	241	249	239

Table 6. Soybeans, Wheat, and Sugar Beet Estimated Costs and Returns, by Region (continued)

Per Unit	Soybeans NW	Soybeans WC	Soybeans C	Soybeans SW	Soybeans SC	Soybeans SE	Wheat NW	Wheat WC	Sugar beets NW	Sugar beets WC
Product yield	27.4 bu	36.5 bu	40.2 bu	44.8 bu	47.2 bu	46.5 bu	47.6 bu	48.8 bu	21.0 ton	23.0 ton
Price, present value equivalent	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 5.00	\$ 5.00	\$ 41.00	\$ 41.00
REVENUE										
Primary product	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 9.00	\$ 5.00	\$ 5.00	\$ 41.00	\$ 41.00
Government payments	\$ 0.37	\$ 0.37	\$ 0.37	\$ 0.37	\$ 0.37	\$ 0.37	\$ 0.44	\$ 0.44	\$ -	\$ -
Miscellaneous income	\$ 0.73	\$ 0.46	\$ 0.39	\$ 0.32	\$ 0.39	\$ 0.44	\$ (0.01)	\$ 0.16	\$ 1.90	\$ 5.33
Total Revenue	\$ 10.11	\$ 9.83	\$ 9.77	\$ 9.69	\$ 9.76	\$ 9.82	\$ 5.43	\$ 5.60	\$ 42.90	\$ 46.33
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(0-20-0)	(0-0-0)	(0-0-0)	(0-0-0)	(0-0-0)	(0-0-0)	(115-30-15)	(115-15-25)	(100-35-0)	(100-10-0)
COSTS										
Seed	\$ 1.83	\$ 1.37	\$ 1.24	\$ 1.12	\$ 1.06	\$ 1.07	\$ 0.42	\$ 0.41	\$ 4.29	\$ 3.91
Fertilizer	\$ 0.24	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1.22	\$ 1.18	\$ 2.31	\$ 1.75
Crop chemicals	\$ 1.73	\$ 1.29	\$ 1.18	\$ 1.05	\$ 1.00	\$ 1.02	\$ 1.25	\$ 1.22	\$ 4.33	\$ 4.65
Crop insurance	\$ 0.91	\$ 0.63	\$ 0.67	\$ 0.55	\$ 0.59	\$ 0.66	\$ 0.64	\$ 0.44	\$ 1.01	\$ 0.95
Miscellaneous	\$ 0.44	\$ 0.41	\$ 0.46	\$ 0.35	\$ 0.38	\$ 0.40	\$ 0.24	\$ 0.27	\$ 6.28	\$ 3.31
Machinery w/labor	\$ 1.69	\$ 1.44	\$ 1.37	\$ 1.30	\$ 1.26	\$ 1.27	\$ 0.91	\$ 0.90	\$ 7.26	\$ 6.63
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 0.02	\$ 0.12	\$ -	\$ -
Transport	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.51	\$ 0.51
Labor & Mgmt (non-machinery)	\$ 1.07	\$ 1.06	\$ 1.09	\$ 0.86	\$ 0.89	\$ 1.03	\$ 0.64	\$ 0.61	\$ 7.76	\$ 7.66
Rent	\$ 2.29	\$ 2.54	\$ 2.94	\$ 2.92	\$ 3.26	\$ 3.25	\$ 1.25	\$ 1.60	\$ 4.04	\$ 5.06
Interest on pre-harvest var. expenses	\$ 0.21	\$ 0.15	\$ 0.14	\$ 0.12	\$ 0.12	\$ 0.12	\$ 0.15	\$ 0.14	\$ 0.57	\$ 0.53
Total Listed Costs	\$ 10.53	\$ 9.01	\$ 9.20	\$ 8.39	\$ 8.69	\$ 8.95	\$ 6.85	\$ 7.00	\$ 38.35	\$ 34.98
NET RETURN	\$ (0.42)	\$ 0.82	\$ 0.57	\$ 1.30	\$ 1.07	\$ 0.87	\$ (1.42)	\$ (1.41)	\$ 4.55	\$ 11.35
Labor & management hours	0.046	0.048	0.056	0.045	0.042	0.045	0.027	0.028	0.268	0.205
Total Energy (mmBTU)/lb product	0.034	0.026	0.025	0.024	0.023	0.023	0.075	0.077	0.199	0.178
Total Emissions (kg CO ₂ eq)/main product	2.34	1.75	1.69	1.62	1.59	1.59	4.98	4.95	11.86	10.38

Table 7. Alfalfa Hay Estimated Costs and Returns, Direct Seeded, by Region

Per Acre	Perennial: Alfalfa - Dir » MN (4 yrs)	Perennial: Alfalfa - Dir » NW (4 yrs)	Perennial: Alfalfa - Dir » WC (4 yrs)	Perennial: Alfalfa - Dir » C (4 yrs)	Perennial: Alfalfa - Dir » SW (4 yrs)	Perennial: Alfalfa - Dir » SC (4 yrs)	Perennial: Alfalfa - Dir » SE (4 yrs)
Product yield	3.5 ton	2.7 ton	2.7 ton	3.7 ton	4.3 ton	4.4 ton	4.2 ton
Product price, present value equivalent	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 117.74
REVENUE							
Product revenue	\$ 415	\$ 322	\$ 322	\$ 435	\$ 508	\$ 518	\$ 500
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ 0	\$ -	\$ -	\$ 0	\$ -	\$ 1	\$ 0
Total Revenue	\$ 415	\$ 322	\$ 322	\$ 435	\$ 508	\$ 519	\$ 500
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(0-20-45)	(0-30-10)	(0-30-10)	(0-0-35)	(0-20-50)	(0-15-50)	(0-8-48)
COSTS							
Seed	\$ 12	\$ 12	\$ 12	\$ 12	\$ 12	\$ 12	\$ 12
Fertilizer	\$ 37	\$ 25	\$ 25	\$ 26	\$ 40	\$ 38	\$ 34
Crop chemicals	\$ 23	\$ 23	\$ 23	\$ 23	\$ 23	\$ 23	\$ 23
Crop insurance	\$ 1	\$ 2	\$ 2	\$ 3	\$ 1	\$ 1	\$ 1
Miscellaneous	\$ 20	\$ 13	\$ 13	\$ 21	\$ 19	\$ 29	\$ 19
Machinery w/labor	\$ 68	\$ 62	\$ 62	\$ 70	\$ 75	\$ 75	\$ 74
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 2	\$ 2	\$ 2	\$ 3	\$ 3	\$ 3	\$ 3
Labor & Mgmt (non-machinery)	\$ 53	\$ 39	\$ 39	\$ 50	\$ 60	\$ 45	\$ 59
Rent	\$ 105	\$ 44	\$ 44	\$ 91	\$ 129	\$ 121	\$ 111
Interest on pre-harvest var. expenses	\$ 4	\$ 4	\$ 4	\$ 4	\$ 5	\$ 5	\$ 4
Total Listed Costs	\$ 328	\$ 227	\$ 227	\$ 303	\$ 366	\$ 353	\$ 340
NET RETURN	\$ 87	\$ 95	\$ 95	\$ 132	\$ 142	\$ 166	\$ 160
Labor & management hours	3.9	2.6	2.6	4.4	3.4	3.8	4.1
Total Energy (mmBTU)/A main product	2.41	2.12	2.12	2.34	2.64	2.64	2.57
Total Emissions (kg CO ₂ eq)/A main product	189	164	164	180	209	208	201

Table 7. Alfalfa Hay Estimated Costs and Returns, Direct Seeded, by Region (continued)

Per Unit	Perennial:	Perennial:	Perennial:	Perennial:	Perennial:	Perennial:	Perennial:
	Alfalfa - Dir » MN (4 yrs)	Alfalfa - Dir » NW (4 yrs)	Alfalfa - Dir » WC (4 yrs)	Alfalfa - Dir » C (4 yrs)	Alfalfa - Dir » SW (4 yrs)	Alfalfa - Dir » SC (4 yrs)	Alfalfa - Dir » SE (4 yrs)
Product yield	3.5 ton	2.7 ton	2.7 ton	3.7 ton	4.3 ton	4.4 ton	4.2 ton
Price, present value equivalent	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 117.74
REVENUE							
Primary product	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 118.47	\$ 117.74
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ 0.07	\$ -	\$ -	\$ 0.04	\$ -	\$ 0.17	\$ 0.05
Total Revenue	\$ 118.55	\$ 118.47	\$ 118.47	\$ 118.51	\$ 118.47	\$ 118.65	\$ 117.79
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(0-20-45)	(0-30-10)	(0-30-10)	(0-0-35)	(0-20-50)	(0-15-50)	(0-8-48)
COSTS							
Seed	\$ 3.54	\$ 4.55	\$ 4.55	\$ 3.37	\$ 2.89	\$ 2.83	\$ 2.92
Fertilizer	\$ 10.66	\$ 9.01	\$ 9.01	\$ 7.10	\$ 9.23	\$ 8.67	\$ 8.01
Crop chemicals	\$ 6.50	\$ 8.37	\$ 8.37	\$ 6.19	\$ 5.30	\$ 5.20	\$ 5.36
Crop insurance	\$ 0.40	\$ 0.71	\$ 0.71	\$ 0.79	\$ 0.32	\$ 0.20	\$ 0.28
Miscellaneous	\$ 5.85	\$ 4.96	\$ 4.96	\$ 5.78	\$ 4.46	\$ 6.66	\$ 4.38
Machinery w/labor	\$ 19.55	\$ 22.89	\$ 22.89	\$ 19.01	\$ 17.42	\$ 17.23	\$ 17.46
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70	\$ 0.70
Labor & Mgmt (non-machinery)	\$ 15.04	\$ 14.43	\$ 14.43	\$ 13.72	\$ 13.88	\$ 10.38	\$ 13.81
Rent	\$ 30.14	\$ 16.32	\$ 16.32	\$ 24.77	\$ 29.98	\$ 27.69	\$ 26.04
Interest on pre-harvest var. expenses	\$ 1.27	\$ 1.41	\$ 1.41	\$ 1.12	\$ 1.09	\$ 1.05	\$ 1.05
Total Listed Costs	\$ 93.64	\$ 83.36	\$ 83.36	\$ 82.57	\$ 85.28	\$ 80.63	\$ 80.00
NET RETURN	\$ 24.90	\$ 35.11	\$ 35.11	\$ 35.94	\$ 33.19	\$ 38.01	\$ 37.78
Labor & management hours	1.102	0.947	0.947	1.204	0.798	0.859	0.969
Total Energy (mmBTU)/lb product	0.689	0.779	0.779	0.638	0.615	0.604	0.605
Total Emissions (kg CO ₂ eq)/main product	53.93	60.38	60.38	49.07	48.68	47.65	47.36

Table 8. Alfalfa Hay Estimated Costs and Returns by Stage, Minnesota

Per Acre	Alfalfa Est-Dir » MN	Alfalfa Est-CC » MN	Alfalfa Mature » MN	Perennial: Alfalfa - Dir » MN (4 yrs)	Perennial: Alfalfa - CC » MN (4 yrs)
Product yield	2.0 ton	0.0 ton	4.0 ton	3.5 ton	3.0 ton
Product price, present value equivalent	\$ 120.00		\$ 120.00	\$ 118.47	\$ 116.44
Secondary product		Oatlage			Oatlage
Secondary product yield		2.0 ton			0.5 ton
Secondary product price		\$ 60.00			\$ 65.34
REVENUE					
Product revenue	\$ 240	\$ -	\$ 480	\$ 415	\$ 349
Secondary product	\$ -	\$ 120	\$ -	\$ -	\$ 33
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Total Revenue	\$ 240	\$ 120	\$ 480	\$ 415	\$ 382
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(0-20-45)	(0-20-45)	(0-20-45)	(0-20-45)	(0-20-45)
COSTS					
Seed	\$ 45	\$ 65	\$ -	\$ 12	\$ 18
Fertilizer	\$ 37	\$ 37	\$ 37	\$ 37	\$ 37
Crop chemicals	\$ 41	\$ -	\$ 16	\$ 23	\$ 12
Crop insurance	\$ 1	\$ 1	\$ 1	\$ 1	\$ 1
Miscellaneous	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20
Machinery w/labor	\$ 52	\$ 27	\$ 74	\$ 68	\$ 61
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 1	\$ 1	\$ 3	\$ 2	\$ 2
Labor & Mgmt (non-machinery)	\$ 53	\$ 53	\$ 53	\$ 53	\$ 53
Rent	\$ 105	\$ 105	\$ 105	\$ 105	\$ 105
Interest on pre-harvest var. expenses	\$ 6	\$ 5	\$ 4	\$ 4	\$ 4
Total Listed Costs	\$ 363	\$ 315	\$ 314	\$ 328	\$ 315
NET RETURN	\$ (123)	\$ (195)	\$ 166	\$ 87	\$ 68
Labor & management hours	3.9	3.8	3.8	3.9	3.8
Total Energy (mmBTU)/A main product	1.70	1.03	2.65	2.41	2.24
Total Emissions (kg CO ₂ eq)/A main product	123	70	211	189	175
Total Energy (mmBTU)/A secondary prod	0.00	1.03	0.00	0.00	0.26
Total Emissions (kg CO ₂ eq)/A second prod	0	70	0	0	17

Table 8. Alfalfa Hay Estimated Costs and Returns by Stage, Minnesota (continued)

Per Unit	Alfalfa			Perennial:	Perennial:
	Est-Dir » MN	Alfalfa Est-CC » MN	Alfalfa Mature » MN	Alfalfa - Dir » MN (4 yrs)	Alfalfa - CC » MN (4 yrs)
Product yield	2.0 ton	0.0 ton	4.0 ton	3.5 ton	3.0 ton
Price, present value equivalent	\$ 120.00		\$ 120.00	\$ 118.47	\$ 116.44
Secondary product		Oatlage			Oatlage
Secondary product yield		2.0 ton			0.5 ton
Secondary product price		\$ 60.00			\$ 65.34
		/Unit of Second			
		Prod			
REVENUE					
Primary product	\$ 120.00	\$ -	\$ 120.00	\$ 118.47	\$ 116.44
Secondary product		\$ 60.00			\$ 65.34
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ 0.13	\$ 0.13	\$ 0.06	\$ 0.07	\$ 0.09
Total Revenue	\$ 120.13	\$ 60.13	\$ 120.06	\$ 118.55	\$ 127.42
Fertilizer (lbs N-P ₂ O ₅ -K ₂ O)	(0-20-45)	(0-20-45)	(0-20-45)	(0-20-45)	(0-20-45)
COSTS					
Seed	\$ 22.74	\$ 32.52	\$ -	\$ 3.54	\$ 5.90
Fertilizer	\$ 18.65	\$ 18.65	\$ 9.33	\$ 10.66	\$ 12.43
Crop chemicals	\$ 20.40	\$ -	\$ 4.00	\$ 6.50	\$ 3.88
Crop insurance	\$ 0.69	\$ 0.69	\$ 0.35	\$ 0.40	\$ 0.46
Miscellaneous	\$ 10.24	\$ 10.24	\$ 5.12	\$ 5.85	\$ 6.83
Machinery w/labor	\$ 26.17	\$ 13.27	\$ 18.62	\$ 19.55	\$ 20.47
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 0.71	\$ 0.71	\$ 0.71	\$ 0.70	\$ 0.82
Labor & Mgmt (non-machinery)	\$ 26.32	\$ 26.32	\$ 13.16	\$ 15.04	\$ 17.54
Rent	\$ 52.74	\$ 52.74	\$ 26.37	\$ 30.14	\$ 35.16
Interest on pre-harvest var. expenses	\$ 3.06	\$ 2.34	\$ 0.95	\$ 1.27	\$ 1.34
Total Listed Costs	\$ 181.73	\$ 157.49	\$ 78.60	\$ 93.64	\$ 104.85
NET RETURN	\$ (61.60)	\$ (97.36)	\$ 41.47	\$ 24.90	\$ 22.56
Labor & management hours	1.968	1.916	0.958	1.102	1.277
Total Energy (mmBTU)/lb product	0.851		0.662	0.689	0.747
Total Emissions (kg CO ₂ eq)/main product	61.52		52.66	53.93	58.46
Total Energy (mmBTU)/lb secondary prod		0.513			0.513
Total Emissions (kg CO ₂ eq)/lb second prod		34.78			34.78

Table 9. Net Returns Per Acre by Year and Net Present Value of Returns for High-Fertilization Grassland, Minnesota

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Average	NPV	Annualized NPV
CROP BUDGET	Switchgrass Plant » MN	Switchgrass Maint 1 » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN	Switchgrass Harvest » MN			
REVENUE													
Primary product	\$ -	\$ 120	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 204	\$ 1,433	\$ 184
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ 120	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 240	\$ 204	\$ 1,433	\$ 184
COSTS													
Seed	\$ 25	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ 23	\$ 3
Fertilizer & Lime	\$ -	\$ -	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 62	\$ 50	\$ 342	\$ 44
Crop chemicals	\$ 22	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2	\$ 21	\$ 3
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 16	\$ 35	\$ 46	\$ 46	\$ 46	\$ 46	\$ 46	\$ 46	\$ 46	\$ 46	\$ 42	\$ 302	\$ 39
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ -	\$ 21	\$ 42	\$ 42	\$ 42	\$ 42	\$ 42	\$ 42	\$ 42	\$ 42	\$ 36	\$ 253	\$ 32
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 147	\$ 19
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 294	\$ 38
Int on pre-harvest var exp	\$ 2	\$ 1	\$ 3	\$ 3	\$ 3	\$ 3	\$ 3	\$ 3	\$ 3	\$ 3	\$ 3	\$ 21	\$ 3
Total Listed Costs	\$ 125	\$ 117	\$ 214	\$ 214	\$ 214	\$ 214	\$ 214	\$ 214	\$ 214	\$ 214	\$ 195	\$ 1,404	\$ 180
NET RETURN	\$ (125)	\$ 3	\$ 26	\$ 26	\$ 26	\$ 26	\$ 26	\$ 26	\$ 26	\$ 26	\$ 9	\$ 29	\$ 4
CUMULATIVE NET RETURN	\$ (125)	\$ (122)	\$ (96)	\$ (70)	\$ (43)	\$ (17)	\$ 9	\$ 35	\$ 61	\$ 87			

Table 10. Net Returns Per Acre by Year and Net Present Value of Returns for Low-Fertilization Grassland, Minnesota

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
CROP	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
BUDGET	Plant » MN	Maint 1 » MN	Maint 2 » MN	Maint 3 » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN	Harvest » MN
REVENUE														
Primary product	\$ -	\$ -	\$ 60	\$ 90	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ -	\$ 60	\$ 90	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120
COSTS														
Seed	\$ 70	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fertilizer & Lime	\$ -	\$ -	\$ 14	\$ 18	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39
Crop chemicals	\$ 22	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 16	\$ 5	\$ 1	\$ 26	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ -	\$ -	\$ 11	\$ 16	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40
Int on pre-harvest var exp	\$ 4	\$ 0	\$ 1	\$ 1	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2
Total Listed Costs	\$ 172	\$ 65	\$ 86	\$ 122	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152
NET RETURN	\$ (172)	\$ (65)	\$ (26)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)
CUMULATIVE NET RETURN	\$ (172)	\$ (237)	\$ (263)	\$ (294)	\$ (326)	\$ (358)	\$ (390)	\$ (422)	\$ (454)	\$ (486)	\$ (518)	\$ (550)	\$ (583)	\$ (615)

Table 10. (continued)

CROP BUDGET	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Average	NPV	Annualized NPV
	Prairie Harvest » MN	Prairie Harvest » MN	Prairie Harvest » MN	Prairie Harvest » MN	Prairie Harvest » MN	Prairie Harvest » MN			
REVENUE									
Primary product	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 104	\$ 1,082	\$ 89
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 120	\$ 104	\$ 1,082	\$ 89
COSTS									
Seed	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3	\$ 66	\$ 5
Fertilizer & Lime	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 39	\$ 32	\$ 335	\$ 28
Crop chemicals	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1	\$ 21	\$ 2
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 30	\$ 27	\$ 282	\$ 23
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 21	\$ 18	\$ 191	\$ 16
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 229	\$ 19
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 459	\$ 38
Int on pre-harvest var exp	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 2	\$ 22	\$ 2
Total Listed Costs	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 152	\$ 144	\$ 1,605	\$ 132
NET RETURN	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (32)	\$ (40)	\$ (523)	\$ (43)
CUMULATIVE NET RETURN	\$ (647)	\$ (679)	\$ (711)	\$ (743)	\$ (775)	\$ (807)			

Table 11. Net Returns Per Acre by Year and Net Present Value of Returns for Hybrid Poplar, Minnesota

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
CROP	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar	Poplar
BUDGET	Plant » MN	Maint 1 » MN	Maint 2 » MN	Maint 3 » MN	Maint 4 » MN	Maint 5 » MN	Maint 6 » MN	Harvest » MN	Maint 1 » MN	Maint 2 » MN	Maint 3 » MN	Maint 4 » MN	Maint 5 » MN	Maint 6 » MN
REVENUE														
Primary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,920	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,920	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
COSTS														
Seed	\$ 102	\$ 20	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20	\$ -	\$ -	\$ -	\$ -	\$ -
Fertilizer & Lime	\$ -	\$ -	\$ -	\$ 51	\$ -	\$ 51	\$ -	\$ -	\$ -	\$ -	\$ 51	\$ -	\$ 51	\$ -
Crop chemicals	\$ 58	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 103	\$ 30	\$ 28	\$ 9	\$ -	\$ -	\$ 9	\$ 907	\$ 30	\$ 28	\$ 9	\$ -	\$ -	\$ 9
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 306	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40
Int on pre-harvest var exp	\$ 6	\$ 1	\$ 0	\$ 2	\$ -	\$ 2	\$ 0	\$ 5	\$ 1	\$ 0	\$ 2	\$ -	\$ 2	\$ 0
Total Listed Costs	\$ 329	\$ 112	\$ 88	\$ 122	\$ 60	\$ 113	\$ 69	\$ 1,278	\$ 112	\$ 88	\$ 122	\$ 60	\$ 113	\$ 69
NET RETURN	\$ (329)	\$ (112)	\$ (88)	\$ (122)	\$ (60)	\$ (113)	\$ (69)	\$ 642	\$ (112)	\$ (88)	\$ (122)	\$ (60)	\$ (113)	\$ (69)
CUMULATIVE NET RETURN	\$ (329)	\$ (440)	\$ (528)	\$ (650)	\$ (710)	\$ (823)	\$ (891)	\$ (250)	\$ (361)	\$ (449)	\$ (571)	\$ (631)	\$ (744)	\$ (812)

Table 11. (continued)

	Year 15	Year 16	Year 17	Average	NPV	Annualized NPV
CROP BUDGET	Poplar Maint 6 » MN	Poplar Harvest » MN	Poplar Stump Rmv » MN			
REVENUE						
Primary product	\$ -	\$ 1,920	\$ -	\$ 226	\$ 1,960	\$ 177
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ 1,920	\$ -	\$ 226	\$ 1,960	\$ 177
COSTS						
Seed	\$ -	\$ -	\$ -	\$ 8	\$ 127	\$ 11
Fertilizer & Lime	\$ -	\$ -	\$ -	\$ 12	\$ 127	\$ 11
Crop chemicals	\$ -	\$ -	\$ -	\$ 3	\$ 54	\$ 5
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 9	\$ 907	\$ 300	\$ 140	\$ 1,243	\$ 112
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ -	\$ 306	\$ -	\$ 36	\$ 313	\$ 28
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 210	\$ 19
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 419	\$ 38
Int on pre-harvest var exp	\$ 0	\$ 5	\$ 2	\$ 2	\$ 17	\$ 2
Total Listed Costs	\$ 69	\$ 1,278	\$ 362	\$ 261	\$ 2,510	\$ 226
NET RETURN	\$ (69)	\$ 642	\$ (362)	\$ (35)	\$ (550)	\$ (50)
CUMULATIVE NET RETURN	\$ (881)	\$ (240)	\$ (601)			

Table 12. Net Returns Per Acre by Year and Net Present Value of Returns for Willow, Minnesota

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
CROP	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow	Willow
BUDGET	Plant » MN	Maint 1 » MN	Maint 2 » MN	Harvest » MN	Maint 1 » MN	Maint 2 » MN	Harvest » MN	Maint 1 » MN	Maint 2 » MN	Harvest » MN	Maint 1 » MN	Maint 2 » MN	Harvest » MN	Maint 1 » MN
REVENUE														
Primary product	\$ -	\$ -	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ -	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -
COSTS														
Seed	\$ 1,045	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fertilizer & Lime	\$ -	\$ 51	\$ -	\$ -	\$ 51	\$ -	\$ -	\$ 51	\$ -	\$ -	\$ 51	\$ -	\$ -	\$ 51
Crop chemicals	\$ 77	\$ 77	\$ -	\$ -	\$ 77	\$ -	\$ -	\$ 77	\$ -	\$ -	\$ 77	\$ -	\$ -	\$ 77
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ 162	\$ -	\$ -	\$ 243	\$ -	\$ -	\$ 243	\$ -	\$ -	\$ 243	\$ -	\$ -	\$ 243	\$ -
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ -	\$ -	\$ -	\$ 132	\$ -	\$ -	\$ 132	\$ -	\$ -	\$ 132	\$ -	\$ -	\$ 132	\$ -
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40
Int on pre-harvest var exp	\$ 40	\$ 5	\$ -	\$ 1	\$ 5	\$ -	\$ 1	\$ 5	\$ -	\$ 1	\$ 5	\$ -	\$ 1	\$ 5
Total Listed Costs	\$ 1,385	\$ 193	\$ 60	\$ 436	\$ 193	\$ 60	\$ 436	\$ 193	\$ 60	\$ 436	\$ 193	\$ 60	\$ 436	\$ 193
NET RETURN	\$ (1,385)	\$ (193)	\$ (60)	\$ 392	\$ (193)	\$ (60)	\$ 392	\$ (193)	\$ (60)	\$ 392	\$ (193)	\$ (60)	\$ 392	\$ (193)
CUMULATIVE NET RETURN	\$ (1,385)	\$ (1,578)	\$ (1,638)	\$ (1,246)	\$ (1,439)	\$ (1,499)	\$ (1,107)	\$ (1,300)	\$ (1,360)	\$ (968)	\$ (1,161)	\$ (1,221)	\$ (830)	\$ (1,022)

Table 12. (continued)

	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Average	NPV	Annualized NPV
CROP BUDGET	Willow Maint 2 » MN	Willow Harvest » MN	Willow Maint 1 » MN	Willow Maint 2 » MN	Willow Harvest » MN	Willow Stump Rmv » MN			
REVENUE									
Primary product	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -	\$ 248	\$ 2,657	\$ 219
Secondary product	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Government payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous income	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenue	\$ -	\$ 828	\$ -	\$ -	\$ 828	\$ -	\$ 248	\$ 2,657	\$ 219
COSTS									
Seed	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 52	\$ 986	\$ 81
Fertilizer & Lime	\$ -	\$ -	\$ 51	\$ -	\$ -	\$ -	\$ 15	\$ 184	\$ 15
Crop chemicals	\$ -	\$ -	\$ 77	\$ -	\$ -	\$ -	\$ 27	\$ 352	\$ 29
Crop insurance	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Miscellaneous	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Machinery w/labor	\$ -	\$ 243	\$ -	\$ -	\$ 243	\$ 300	\$ 96	\$ 1,026	\$ 84
Crop drying	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Transport	\$ -	\$ 132	\$ -	\$ -	\$ 132	\$ -	\$ 40	\$ 424	\$ 35
Labor & Mgmt (non-mach.)	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 20	\$ 229	\$ 19
Rent	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 40	\$ 459	\$ 38
Int on pre-harvest var exp	\$ -	\$ 1	\$ 5	\$ -	\$ 1	\$ 2	\$ 4	\$ 59	\$ 5
Total Listed Costs	\$ 60	\$ 436	\$ 193	\$ 60	\$ 436	\$ 362	\$ 294	\$ 3,719	\$ 306
NET RETURN	\$ (60)	\$ 392	\$ (193)	\$ (60)	\$ 392	\$ (362)	\$ (46)	\$ (1,062)	\$ (87)
CUMULATIVE NET RETURN	\$ (1,082)	\$ (691)	\$ (884)	\$ (944)	\$ (552)	\$ (914)			

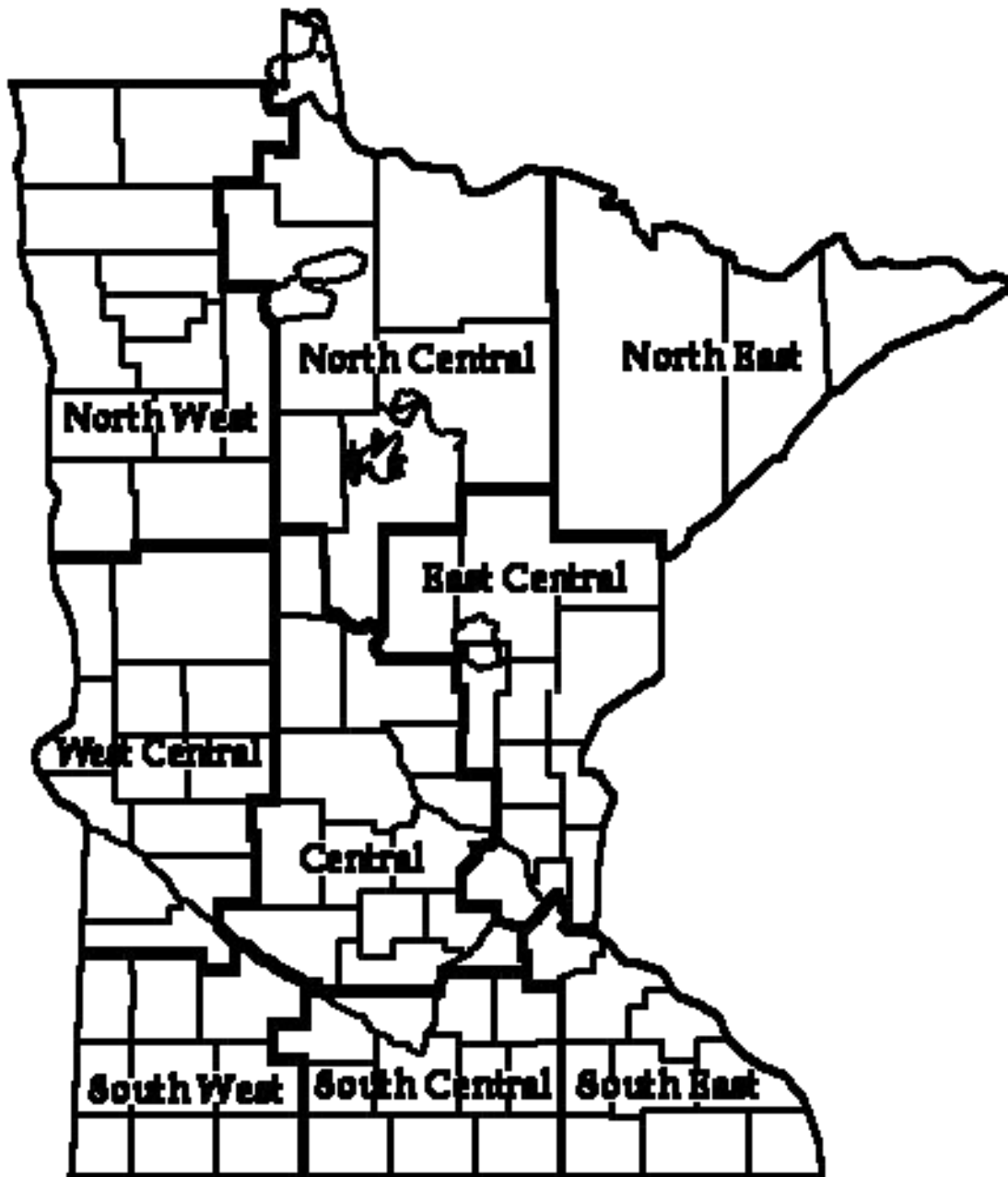


Figure 1. National Agricultural Statistics Service Reporting Districts in Minnesota

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