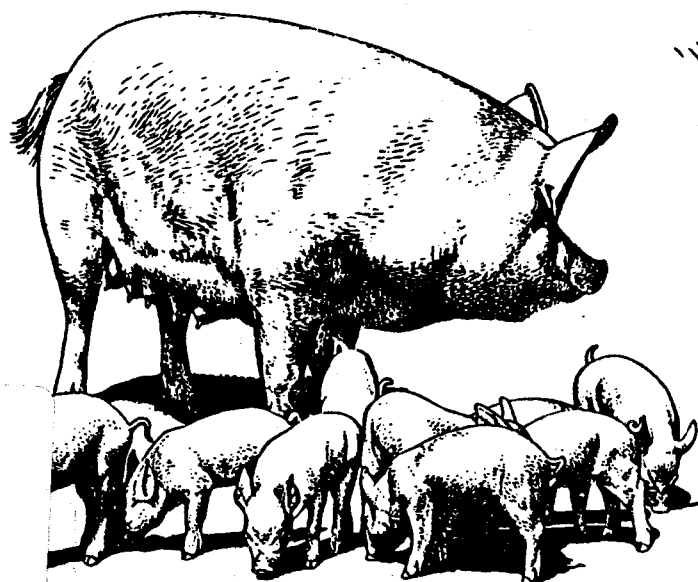


Economics of Enhanced Livestock Production



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HIGHLIGHTS

Value added to grains and forages sold through livestock can benefit North Dakota's economy. The amount of benefit depends on the extent livestock can be added profitably to grain farms. This project was designed to determine the economic impact of adding beef, sheep, or swine enterprises to model North Dakota farms. The project was composed of six steps: 1) Specify model farms for three regions in North Dakota, western, eastern, and central; 2) Prepare enterprise budgets to estimate profitability for each species of livestock; 3) Construct a linear programming matrix to determine the optimal enterprise-resource mix to yield the greatest return to overhead; 4) Develop a five-year transitional cash flow to determine the amount of capital required; 5) Estimate the economic impact of adding livestock to the farms on a per-farm basis; and 6) Determine the number of North Dakota farms, which do not have livestock.

Livestock enterprises investigated were cow-calf on pasture, cow-calf drylot, farrow-to-finish confinement hogs, and ewe flock on pasture. Crop and livestock enterprise budgets were developed to estimate returns over cash costs for each model farm, using price projections from 1992 through 1996. A high and low price for each livestock species was also included in the linear programming matrix to determine the effect of price on herd or flock size. Availability of farm labor, owner and hired, was considered when the livestock enterprises were added to each farm. Maximum annual returns to overhead were estimated using linear programming. A transitional cash flow indicated whether adding a specific livestock enterprise was viable for each model farm. Changes in ending owner's equity among the alternatives were compared relative to the differences in labor requirements of each species of livestock.

The baseline farm, with drylot cows included, resulted in the greatest return to overhead in Adams County (western region). Next highest returns to overhead resulted with the baseline farm combined with the confinement swine enterprise. The greatest cumulative cash flow in Adams County resulted with the baseline model; however, the greatest equity after five years is slightly better (\$8,600) with the combination baseline farm and farrow-to-finish hog operation. Increased returns to equity per hour of owner labor are slight.

Farrow-to-finish swine had the greatest returns to overhead of the livestock species considered in the Cass County model farm (eastern region). Cumulative returns to land, owner-labor, and management for the farrow-to-finish swine alternative exceeded all other alternatives after four years. Owner-labor requirements for the farrow-to-finish swine alternative were increased by 3.6 times over the grain farm alone. Average equity returns per hour of owner labor was \$36.69 per hour with the farrow-to-finish swine operation. Pasture cow-calf and pasture ewe flock did not enter the solution set in Cass County.

Farrow-to-finish swine had the greatest returns to overhead of the livestock species considered in the Foster County model farm (central region). Cumulative returns to land, owner labor, and management for the farrow-to-finish swine was nearly equal to the grain

farm alone after three years and exceeded the grain farm's cumulative returns by 133 percent after five years. Owner-labor requirements for the farrow-to-finish swine alternative were increased by 3.1 times over the grain farm alone. Average returns per hour of owner labor was \$21.36 per hour with the farrow-to-finish swine operation.

While 62 percent of the farms in western North Dakota already have beef cows on the farm, only 9 percent have hogs. There may be potential to include hogs on a greater number of farms in the western region. The eastern region of North Dakota has the greatest potential for including farrow-to-finish swine. The central region of North Dakota has the greatest number of farmers who could include either a confinement beef cow-calf or farrow-to-finish swine operation on their grain farm.

ECONOMICS OF ENHANCED LIVESTOCK PRODUCTION

Randall S. Sell and David L. Watt*

INTRODUCTION

North Dakota farmers are seeking ways to increase the value added on the farm. Value added means increasing the family's earned returns to unpaid operator and family labor, management, and equity capital. Livestock add value to crops; however, detailed economic projections and evaluations are needed for each livestock species considered in a northern environment. Those enterprises that offer a positive returns for under utilized resources, with manageable risk should be targeted for expansion.

Increased income opportunities may exist for North Dakota farmers to add livestock to their farming operations. The added livestock can use waste forage in crop production systems, provide a use for forage from Conservation Reserve Program (CRP) acreage when released, and take advantage of underemployed farm labor during parts of the year. Adding small ruminants to the livestock enterprise would also enhance the use of grasslands infested with leafy spurge and other invading weed species.

Past farm specialization has often led to the sale of livestock enterprises. In fact, many producers are one or more generations removed from raising livestock. The goals of this project were to analyze the profitability and feasibility of adding beef, sheep, or swine to farming operations to diversify the farming systems and to stabilize income.

The feasibility and profitability of adding beef, sheep, or swine enterprise to typical farms in three geographic regions of North Dakota were investigated. To the extent livestock can be added profitably to grain farms, value added to grains and forages sold through the livestock can benefit the North Dakota economy. The livestock enterprises investigated are cow-calf on pasture, cow-calf drylot, farrow-to-finish confinement hogs, and ewe flock on pasture. This project is composed of six steps: 1) Specify of model farms for three regions in North Dakota, western, eastern, and central; 2) Prepare of enterprise budgets to estimate profitability for each species of livestock; 3) Construct a linear programming matrix to determine the optimal enterprise-resource mix to yield the greatest return to overhead; 4) Develop a five-year transitional cash flow to determine the amount of capital required; 5) Estimate the economic impact of adding livestock to the farms on a per-farm basis; and 6) Determine the number of North Dakota farms, which do not currently have livestock.

The following section of this report provides an overview of production coefficients used to develop the linear program and cash flow models for each farm. The subsequent section provides a discussion of the results from the linear program and cash flow for each farm. The third section presents an estimate of the number of North Dakota farms that may adopt a livestock enterprise. The final section of the report is a summary of results.

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DESCRIPTION OF MODEL FARMS

Topography, soil type, and precipitation change from western to eastern North Dakota, resulting in different farming systems across the state. Western North Dakota can be characterized as receiving less precipitation and having more steeply sloping land. Soil densities and water-holding capacities also vary across the state. For this study, North Dakota was divided into three regions, based upon soil type (Omodt et al., 1961) (Figure 1). Western North Dakota has a lower percentage of tillable cropland than eastern North Dakota. Western North Dakota farms have the largest percentage of farms with livestock, with central North Dakota having slightly less and eastern North Dakota having the lowest percentage of farms with livestock (Bureau of Census, 1987).

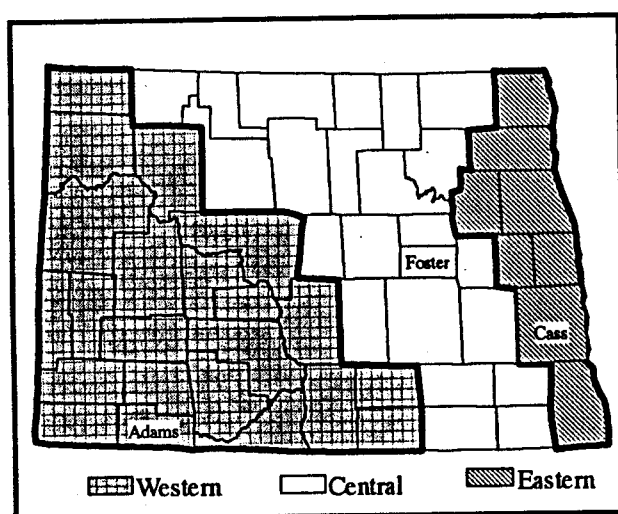


Figure 1. North Dakota Regions.
Source: Omodt (1961).

Model farms representing eastern, central, and western North Dakota were developed for Cass, Foster, and Adams Counties, respectively. Average size farms and enterprise mix for these counties were constructed based on statistics reported in the 1987 Census of Agriculture (Bureau of Census, 1987) (Table 1).

Table 1. Average Farm Size and Enterprise Mix for Cass, Foster, and Adams Counties, 1987

	Cass County average	Foster County average	Adams County average
	-----Acres-----		
Total cropland	962	1,078	1,004
Breakdown of crops			
Wheat - (base acres)	422	611	512
Barley - (base acres)	295	165	67
Oats - (base acres)	--	--	51
Soybean	244	--	--
Sunflower	--	239	--
Fallow	--	63	201
Hay	--	--	173
Native pasture nontillable	--	--	774

Source: Johnson et al. (1990).

Enterprise budgets provide a basis for whole farm budgeting. Crop and livestock enterprise budgets were developed to build the model farm.

Crop Budgets

Enterprise budgets were developed for each crop produced within their respective county. North Dakota State University comprehensive budget generator "COMPBUD" was used to develop individual crop budgets for each county (Edwardson and Hughes, 1988). COMPBUD was designed to help farmers to develop cost estimates for all aspects of crop production. Input costs and machinery complements were developed from the "Estimated 1991 Crop Budgets for South Valley, South Central, and South West Regions of North Dakota, Farm Management Planning Guide" (Aakre and Haugen, 1991).

Selected budget coefficients were modified to more accurately reflect the typical farm situation in the three counties. County level coefficients were estimated for the following items: market yield, market price, Agricultural Stabilization and Conservation Service (ASCS) yields, and fertilizer requirements. Market yields were determined from a ten-year average yield (1981 to 1990) for each crop in the county (North Dakota Agricultural Statistics Reporting Service, 1989, 1990, 1991). Average market price was projected, using Food and Agricultural Policy Research Institute (FAPRI, 1992) price projections from 1992 through 1996. The FAPRI prices are projected prices for the United States; therefore, a local price for each crop was estimated by comparing the U.S. marketing year average price to the marketing year average price for the crop reporting district in which the respective counties were located.

FAPRI does not project prices for oil sunflowers or oats. Oil sunflower price was estimated from FAPRI projected soybean prices. A relationship of North Dakota market year average oil sunflower price and U.S. average soybean price was estimated from 1980 to 1990. This equation was used to estimate an oil sunflower price from the FAPRI soybean projections (equation in Appendix A). Oats price for Adams County was estimated as the ratio of oats to barley price in the Southwest Crop Reporting District from 1981 to 1990. Estimated model farm crop prices for Adams, Cass, and Foster Counties are shown in Appendix A.

Yields used by ASCS for farm program payments (spring wheat, barley, oats) have been frozen since 1981 (ASCS, 1992). ASCS yields for the program crops, therefore, are different from the ten-year average yields used for estimated model farm production. The ASCS yields were multiplied by the deficiency payment per bushel for each crop to determine the amount of deficiency payment per base acre. Deficiency payments per bushel were determined as the difference between the FAPRI price and the target price specified in the 1990 Farm Program. Oil sunflower and soybeans have no deficiency payments.

To receive deficiency payments, farmers must comply with farm program regulations. The regulations are subject to change from year to year. To qualify for deficiency payments, a farmer must idle a percentage of the base acres. This idled land is generally referred to as acreage reduction program acres (ARP) or set-aside acres. For the 1992 crop year, the percent of land that must remain idle for wheat and barley was 5 percent. Oats had no set-aside requirement. Another variation of the farm program is the normal flex acre designation. Normal flex acres constitute 15 percent of the base acres for wheat, barley, and oats. The farmer may plant normal flex acres to the base acre crop or to another crop. Farmers receive no deficiency payments on the normal flex acres, regardless of the type of crop planted. The farm program set-aside and normal flex acre requirements were included in the model farm analysis as they existed for the 1992 crop year.

A resource yield goal was used to determine the crop fertilizer needs. The resource yield goal was assumed to be 135 percent of the ten-year average yield (Toman et al., 1987). Interest on variable cash expenses and other debt obligations was 9.5 percent (Agweek, March 2, 1992). Market yields for each crop within individual counties are shown in Appendix B.

Budgets for native and tame pasture, alfalfa hay, and wild hay were developed from Extension Service budgets and other sources. The cost of alfalfa hay establishment was amortized over four years. This assumes that 25 percent of the existing alfalfa hayland is replanted every year with wheat as a nurse crop to take advantage of existing base acres. The pasture establishment costs were amortized over a ten-year period. Native and tame pasture carrying capacities are shown in Table 2. Alfalfa hay in Cass and Foster Counties was assumed to be harvested twice a year with a mower-conditioner and a large round baler. Alfalfa hay in Adams county was harvested once per year with the same equipment.

Table 2. Estimated Animal Unit Months (AUM) for Rangeland and Tame Pasture in Adams, Cass, and Foster Counties

<u>County</u>	<u>Rangeland</u>	<u>Tame pasture</u>
	-----AUM's/acre-----	
Adams	.44	.66
Cass	n/a	.99
Foster	n/a	.84

Source: Bangsund and Leistritz (1991).

Corn and barley may be produced in the Cass County and Foster County model farms. Corn is not typically produced for grain in Adams County; therefore, only barley was produced for feed in the Adams County model farm. Corn and barley may also be purchased from local markets at \$.10 per bushel more than the selling price to allow for transportation and handling costs.

Livestock Budgets

The three species of livestock considered in this project were beef, sheep, and swine. Four management alternatives were considered to incorporate livestock in the farm. They were cow-calf on pasture, cow-calf in year-round drylot, farrow-to-finish swine, and a ewe flock on pasture.

Two cow-calf management systems were considered. One system is a conventional cow-calf system, which incorporates the use of grazed pastureland. The advantage of this system is the lower labor requirements during the growing season. The disadvantage of this system is the larger amount of land required for forage production. The alternative cow-calf enterprise was a drylot system. This system has larger labor requirements as feed must be taken to the cattle.

The cow herd enterprise budgets were developed, using North Dakota State University Extension Service computer budget generator "Beef Cow Production Planner" (Hughes, 1991). Net returns over cash costs, excluding farm-raised feed costs, are shown in Table 3. Weaning weights and prices in the "Beef Cow Production Planner" were adjusted to more accurately reflect each system. The 1992 to 1996 FAPRI price projections for calves and cull cows were used to project gross revenue (Appendix A). FAPRI price projections for cows and calves are for the United States. The market for cows and feeder calves in North Dakota is representative of the U.S. market; therefore, the FAPRI prices were not adjusted for North Dakota markets (Petry, 1992).

Table 3. Returns Over Cash Costs for Beef Cows on Pasture, Beef Cows in Drylot, Ewes on Pasture, and Confinement Farrow-to-finish Swine

	<u>Pastured cows</u>	<u>Drylot cows</u>	<u>Pastured ewes</u>	<u>Farrow to finish sows</u> ^a
	-----\$/mature cow-----		\$/ewe	\$/sow
Gross income	505.17	463.74	102.68	1,425.31
Total cash expenses ^b	<u>88.30</u>	<u>103.50</u>	<u>18.38</u>	<u>432.76</u>
Net return	416.87	360.24	84.30	992.55

^a Includes cost of 21.71 cwt. supplement at \$11.68 per cwt.

^b Does not include cost of feed grown on the farm. Farm-grown feed costs are shown in the crop enterprise budgets.

Note: Production coefficients for the livestock budgets are shown in Appendix C.

Direct costs, except for farm-raised feed, for the pasture cow system were obtained from the farm record summaries reported in North Dakota Farm Business Management Education (1990). The cost of producing forage is discussed in the crop budget section. Because of the nature of the confinement cow-calf enterprise, direct costs for the confinement cow-calf enterprise was increased by \$20 per cow to represent increased medical and pest control costs (Anderson, 1992; Table 3). Conventional and drylot beef enterprise production coefficients are shown in Appendix C.

The pastured ewe flock enterprise budget was developed, using the "Ewe Flock Cost and Return Budgets for 1992" electronic spreadsheet program (Hughes and Nudell, 1991). Direct costs associated with the pastured ewe flock were obtained from the farm record summaries reported in North Dakota Farm Business Management Education (1990) and Haugen (1992). Production coefficients used to develop the pastured ewe flock enterprise budgets are shown in Appendix C.

The confinement farrow-to-finish swine enterprise budget was developed, using the "Project P.I.G.S. - Farrow-to-Finish Feasibility" electronic spreadsheet (Hughes, 1990). Direct costs, excluding farm-raised feed, production coefficients, and ration requirements were modified based on statistics obtained from the North Dakota Farm Business Management Education (1990) and Crenshaw (1992). Production coefficients used to develop the farrow-to-finish swine budget are shown in Appendix C.

Labor

Availability of labor and investment capital are critical resources that may affect the size of livestock enterprise, added to existing farm operations. Each farmer will have different labor and capital availabilities, around which his farm is organized. Because of the variability in capital and labor available, simplifying assumptions were necessary. One person's labor was assumed to be available to the farm as owner labor. Hired labor was available on an hourly basis.

The availability of farm labor, owner and hired, determined the size of livestock enterprise, which was feasible to add to the farms in each region. Owner labor was available for livestock at 40 hours per week during the non-cropping season (November 11 through April 9). While many farmers may be willing to work more than 40 hours per week, for comparison to off-farm employment, owner labor was limited to 40 hours per week. Hired labor was limited to the same amount during the non-cropping season. Owner labor was available for field work, 60 percent of 11 hours per day (6.6 hours/day) during the cropping season (April 10 through November 10). Twenty percent of the 11-hour day (2.2 hours/day) was available for livestock labor. Hired labor during the cropping season was available for 8.5 hours per day, 7 days per week. Hired labor was assumed to be available for livestock or field labor. Hired labor was paid \$5.28 per hour (USDA, 1991).

Labor requirements for field work depends on the types of machinery and equipment available, field efficiency, and speed. The labor requirements for all field operations were calculated within the COMPBUD program, which assumes 80 percent field efficiency (Table 4). The size and type of machinery complement and speed of operation were obtained from the "Estimated 1991 Crop Budgets for South Valley, South Central, and South West Regions of North Dakota, Farm Management Planning Guide" (Aakre and Haugen, 1991).

Labor requirements for the livestock enterprises were determined per breeding age female (Table 5). Labor requirements are affected by several variables, such as type of feed handling facilities, animal handling facilities, size of the herd, and type of management system. The type of management system (pasture, semi-confinement, or total confinement) has the greatest impact on labor requirements for livestock. The model farms in each region were assumed to have similar feed and livestock handling facilities.

Table 4. Labor Requirements for Crop Alternatives in Model Farms Located in Adams, Cass, and Foster Counties

Adams County						
	<u>Spring wheat</u>	<u>Barley</u>	<u>Oats</u>	<u>Alfalfa hay</u>	<u>Wild hay</u>	<u>Fallow</u>
Hours/acre	.67	.68	.68	.36	.32	.45
Cass County						
	<u>Spring wheat</u>	<u>Barley</u>	<u>Soybean</u>	<u>Alfalfa hay</u>	<u>Corn</u>	<u>Fallow</u>
Hours/acre	.63	.63	.51	.67	.83	.45
Foster County						
	<u>Spring wheat</u>	<u>Barley</u>	<u>Sunflower</u>	<u>Alfalfa hay</u>	<u>Corn</u>	<u>Fallow</u>
Hours/acre	.67	.68	.78	.67	.86	.45

Source: Aakre and Haugen (1991).

Cash Flow

Cash flow was an indicator to determine whether adding a specific livestock enterprise was feasible for each model farm. A five-year whole-farm cash flow was calculated for each viable livestock enterprise, using linear programming results. A cumulative total net cash flow allows comparisons of residual return to owner labor among the alternative management strategies.

An estimate of overhead expenses was used to develop the cash flow analysis. Family living draw was \$20,000 (Table 6). Family living draw includes personal consumption, federal and state taxes. Each model farm was assumed to have the state average debt obligations of \$118,909, which translates into an annual payment of \$18,922 at 9.5 percent interest amortized over 10 years (Bureau of the Census, 1987). Situations vary from farm to farm and will require individual analysis. Existing debt obligations include intermediate debt (machinery, capital improvements, and livestock) and long-term debt (land). Investment in facility requirements was assumed to be \$40,000, \$30,000, and \$13,000 for beef in drylot, beef on pasture, and sheep enterprises, respectively. Additional investment in facilities for the swine operation was \$93,000 in the Adams County model farm and \$125,000 in the Cass County and Foster County model farms. The swine enterprise in the Adams County model farm was approximately one-half the size of the swine enterprise Cass and Foster Counties. Operating expenses generated for the enterprise budgets were used as estimates of variable cash expenses for the cash flow.

Table 5. Labor Requirements for Cow-calf Pasture and Drylot, Pastured Ewe Flock, and Confined Farrow-to-finish Swine Enterprises

	Cow-calf ^a		Ewe flock pastured ^b hrs/ewe	Confined farrow to finish swine ^c hrs/sow
	pastured -----hrs/cow-----	drylot		
January	0.4	0.4	0.1	3.1
February	0.4	0.4	0.1	2.8
March	1.6	1.6	0.3	3.1
April	2.0	2.0	0.4	3.0
May	0.5	1.2	0.3	3.1
June	0.5	1.4	0.3	3.0
July	0.2	0.2	0.2	3.1
August	0.2	0.2	0.2	3.1
September	0.2	0.4	0.1	3.0
October	0.4	0.1	0.1	3.1
November	0.1	0.1	0.1	3.0
December	<u>0.4</u>	<u>0.4</u>	<u>0.1</u>	<u>3.1</u>
Total	6.9	8.4	2.3	36.5

^a Based upon assumption of 75 to 100 head cow herd.

^b Based upon assumption of 150 to 200 head ewe flock.

^c Based upon assumption of total confinement, continuous farrowing facility for 60 brood sows.

Note: Labor requirements do not include labor required for fence repair and maintenance, forage harvesting, and record keeping.

Source: Cow herd (Sell and Watt, 1991; Anderson, 1992), Ewe flock (Sell and Watt, 1991), Farrow-to-finish swine (Crenshaw, 1992).

Table 6. Cash Flow Expenses for Adams, Cass, and Foster County Model Farms, 1992-1996

<u>Item</u>	<u>Years financed</u>	<u>Annual payment</u>
Family living	-	---\$--- 20,000
Existing debt	10	18,922 ^a

^a Total existing debt state average debt was \$118,909 financed at 9.5 percent interest. Census data does not distinguish between intermediate and long term debt.

Facilities were amortized at 9.5 percent interest for 10 years. Per animal cost was \$675, \$300, and \$70 for the beef, swine, and sheep brood stock, respectively. The animals were assumed to be financed at 9.5 percent interest over 5, 3, and 1 years for beef, sheep, and swine, respectively (Table 7). Generally, long-term interest rates differ from short-term interest rates; however, for simplification, rates were assumed to be equal. FAPRI price projections were used for revenue projections in the cash flow. Cash operating costs were constant.

Table 7. Cash Flow Expenses Required for Addition of Livestock to Existing Adams, Cass, and Foster County Model Farms, 1992 to 1996 ^a

<u>Cow herd on pasture</u>			
<u>Item</u>	<u>Years financed</u>	<u>Total investment ^b</u>	<u>Annual payment</u>
		-----\$-----	-----\$-----
Facilities	10	30,000	4,778
Breeding herd-per cow	5	675	176
<u>Cow herd on drylot</u>			
<u>Item</u>	<u>Years financed</u>	<u>Total investment ^b</u>	<u>Annual payment</u>
		-----\$-----	-----\$-----
Facilities	10	40,000	6,371
Breeding herd-per cow	5	675	176
<u>Ewe flock</u>			
<u>Item</u>	<u>Years financed</u>	<u>Total investment ^b</u>	<u>Annual payment</u>
		-----\$-----	-----\$-----
Facilities	10	13,000	2,070
Breeding herd-per ewe	3	70	28
<u>Farrow-to-finish swine</u>			
<u>Item</u>	<u>Years financed</u>	<u>Total investment ^b</u>	<u>Annual payment</u>
		-----\$-----	-----\$-----
Facilities-Adams County	10	93,000	14,812
Facilities-Cass and Foster County	10	125,000	19,908
Breeding herd-per sow	1	300	329

^a Livestock and additional facilities investment amortized at 9.5 percent interest.

^b Additional investment was assumed be sufficient for 100 of pastured cows, 200 head of drylot cows, 400 head of pastured ewes, and in Adams County 60 head of brood sows and 100 head of brood sows in Cass and Foster Counties.

Perennial forage crops were established in the year before introducing beef and sheep enterprises to the farms. This phase of the cash flow analysis was represented by year 0, followed by the five-year cash flow (1992 to 1996). The perennial forages were established, using a cover crop in all model farms. Thus, the cash flow in year 0 represents the same enterprise mix, occurring before the introduction of the livestock enterprise. The livestock were assumed to be purchased in January, February, or March of 1992, depending on the species of livestock. Therefore, necessary feedstuffs were purchased until feedstuffs produced on the farm were available.

LINEAR PROGRAMMING AND TRANSITIONAL CASH FLOW

The model farms were analyzed in a linear programming format to determine optimum production and the level of impact each livestock enterprise would have on annual average return to overhead with existing land and labor. Farm program ARP, target prices, normal flex acre requirements, and ASCS-established yields were included in the model farms as they existed for the 1992 crop season. Owner labor and hired labor also were included in the linear programming matrix. The model farms were analyzed with average, high, and low livestock price projections. The baseline models for each county were chosen because they represented the 'typical' farming system within their respective regions. The baseline model farm for Adams County was a combination grain farm with a pastured cow-calf enterprise. The baseline farms for Foster and Cass Counties were grain farms without livestock.

After using the linear program to estimate each livestock enterprise's returns to unpaid owner labor and overhead, a five-year transitional cash flow was developed to determine whether adding of the various livestock enterprises would increase the owner's equity. The transitional cash flow allowed owner's equity to be estimated after the five-year transition period. Straight line depreciation with no salvage value over 20 years was used to estimate equity on buildings and facilities after five years. Machinery and equipment were depreciated over 10 years, using straight-line depreciation and a 10 percent salvage value.

Adams County

The livestock enterprise combination that had the greatest returns to overhead with average livestock prices was with 75 head of pasture and 117 head of drylot cows (Table 8). This represents a \$19,730 increase in returns to overhead over the baseline model farm with pasture cow-calf herd only. The pasture and drylot cow enterprise combination was followed by the pasture cow and farrow-to-finish swine combination. The pasture cow and pasture cow combined with pastured ewes resulted in substantially lower returns to overhead than the top two alternatives. Available labor in March and part of April is the effective constraint limiting number of cows when drylot cows are added to the baseline farm. April labor is the effective constraint when confinement swine is added to the conventional farm. Pasture was the constraint for the baseline farm and the baseline combined with the ewe flock.

Table 8. Average Annual Returns to Overhead for Adams County With Average, High, and Low Livestock Price Projections, 1992-1996

	Returns to overhead -----\$-----	Cow-calf		Pasture ewe flock -----head-----	Farrow-to- finish swine
		pasture	drylot		
Average livestock prices					
Grain farm with pasture cow-calf	57,360	113	0	0	0
Grain farm with pasture and drylot cow-calf	77,090	75	117	0	0
Grain farm with pasture and ewe flock	58,411	35	0	505	0
Grain farm with pasture and confinement swine	72,683	90	0	0	49
High livestock prices					
Grain farm with pasture cow-calf	58,740	113	0	0	0
Grain farm with pasture and drylot cow-calf	79,366	75	117	0	0
Grain farm with pasture and ewe flock	65,420	7	0	727	0
Grain farm with pasture and confinement swine	86,087	18	0	0	95
Low livestock prices					
Grain farm with pasture cow-calf	55,984	113	0	0	0
Grain farm with pasture and drylot cow-calf	74,823	75	117	0	0
Grain farm with pasture and ewe flock	49,901	0	0	698	0
Grain farm with pasture and confinement swine	65,509	119	0	0	31

The pasture cow and farrow-to-finish swine operation resulted in the greatest returns to overhead with the high livestock price scenario. However, in the low price scenario, the pasture and drylot cows had greater returns to overhead. As the swine prices were increased from low to high, spring wheat produced on fallow and acres of alfalfa decreased. The increase in number of breeding ewes as the price of sheep was increased resulted in the substitution of alfalfa hay for spring wheat on recrop.

The baseline model farm with pasture cows yielded the largest cumulative return after five years, followed by the farrow-to-finish swine enterprise in combination with pasture cows, \$138,201 and \$134,759, respectively (Table 9). The cumulative cash flow in year 0 and 1992 are low for the pasture cows combined with drylot cows and with pastured ewe flock because roughage for extra livestock must be purchased until forage harvested on the farm becomes available. Returns to equity per hour of owner labor were greatest for the grain farm combined with the pasture cow and farrow-to-finish swine enterprise, followed by the grain farm combined with the drylot cow enterprise (Table 10). The grain farm combined with the ewe flock had a negative return per hour of owner labor.

Table 9. Adams County Model Farm Five-year Cash Flow for Grain Farm Combined With Pasture Cow-calf, Pasture Cow-calf and Drylot Cow-calf, Pasture Cow-calf and Pasture Ewe Flock, and Pasture Cow-calf and Farrow-to-finish Swine, 1992-1996

Year ^a	Cumulative total					
	0	1992	1993	1994	1995	1996
	-----\$-----					
Grain farm with pasture cow-calf herd	16,323	36,963	59,933	85,556	111,165	138,201
Grain farm with pasture and drylot cow-calf	2,103	690	20,070	42,062	62,206	82,856
Grain farm with pasture cow-calf and pasture ewe flock	(13,658)	(1,437)	24,179	45,870	66,674	90,746
Grain farm with pasture cow-calf herd and farrow-to-finish swine	15,893	25,058	40,339	68,981	103,990	134,759

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

Table 10. Change in Owner's Equity, Owner Labor Requirements, and Return in Equity Per Hour of Owner Labor for Adams County Model Farm

<u>Farm type</u>	<u>Change in owner's equity ^a</u>	<u>Owner labor per year hours</u>	<u>Change in ending equity per additional hour of owner labor ^b</u>
			\$/hour
Grain farm and pasture cows	n/a	1,036	n/a
Grain farm and pasture cows and drylot cows	\$3,519	1,447	1.71
Grain farm and pasture cows and pasture ewes	(\$62,955)	1,369	(37.81)
Grain farm and pasture cows and confinement swine	\$8,611	1,798	2.26

^a Difference in ending owner's equity for baseline farm and alternatives.

^b Change in equity divided by change in total owner labor for 5 years.

Different farms with alternative management techniques may have different equipment and facility needs when analyzing the possibility of adding livestock. For this reason, the impact of a change in capital investment necessary to accommodate the additional livestock on the marginal returns to owner's labor was estimated (Figures 2 through 4). If all other variables are held constant, additional investment in facilities to add a confinement swine facility must be less than \$75,000 before the marginal return to owner's labor is \$10 per hour (Figure 2). Even with no additional capital investment, the marginal return to owner's labor for adding sheep is negative (Figure 3).

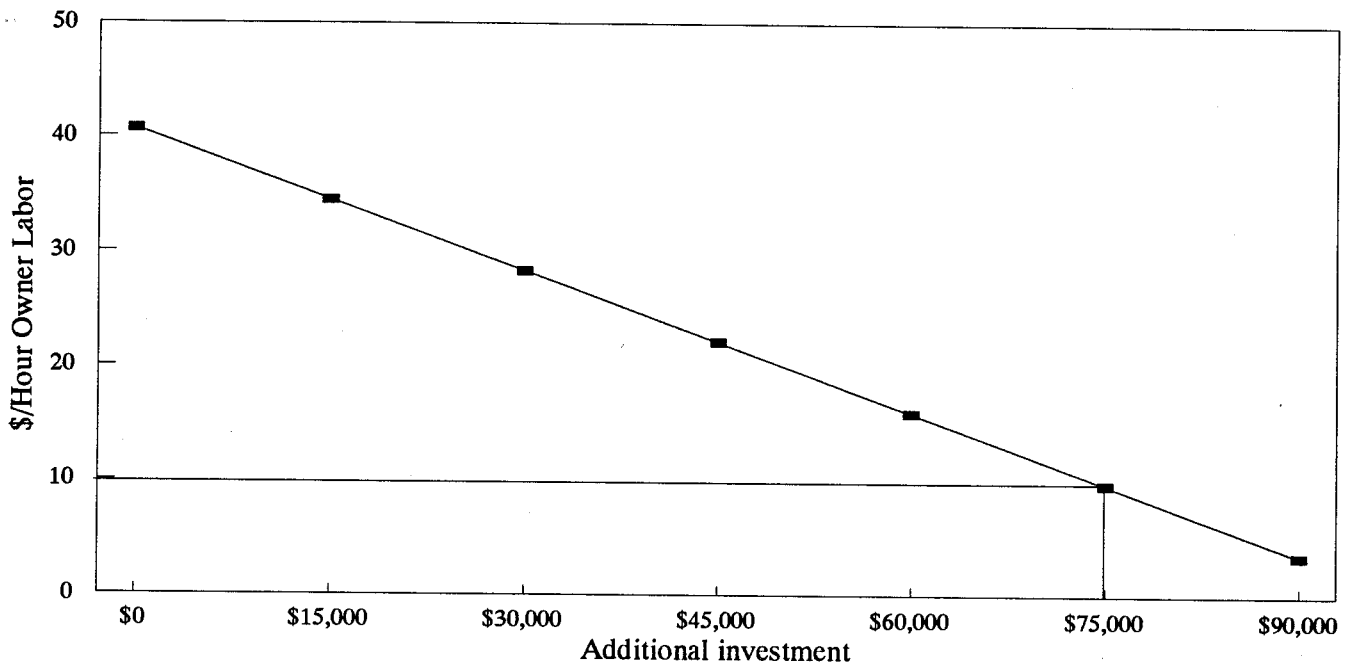


Figure 2. Adams County Model Farm Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Confinement Swine Operation to Baseline.

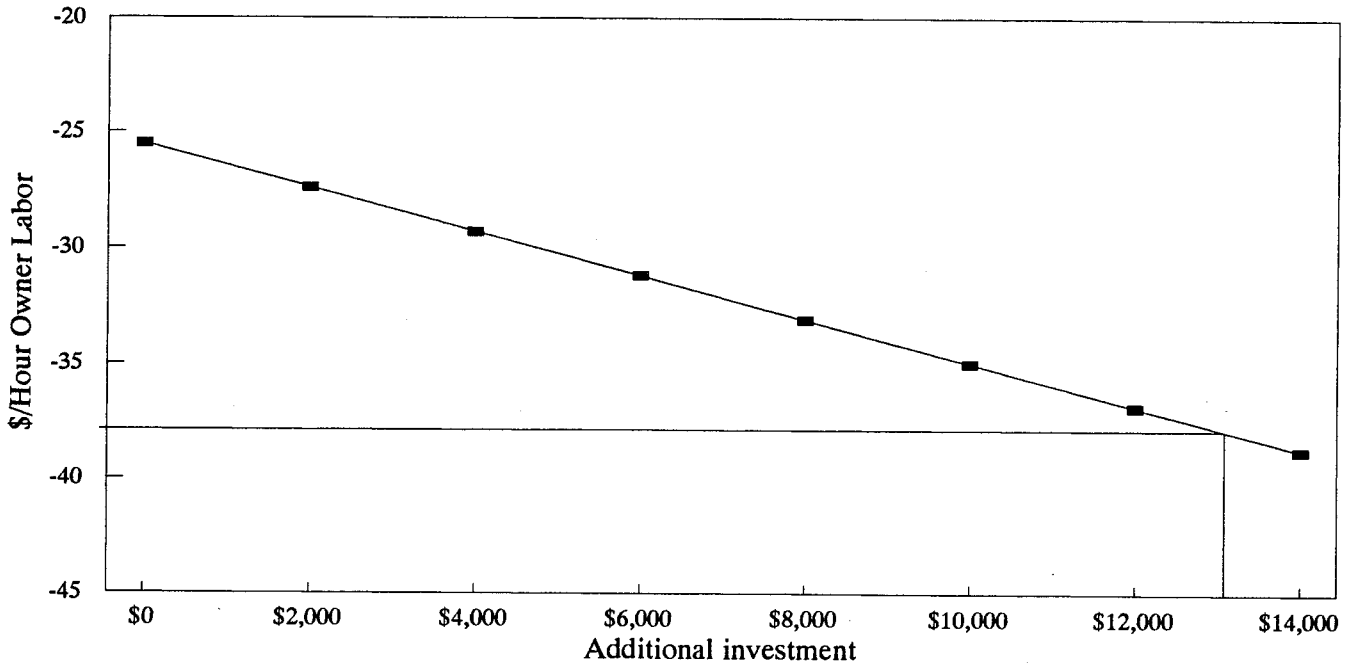


Figure 3. Adams County Model Farm Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Pasture Ewe Flock to Baseline.

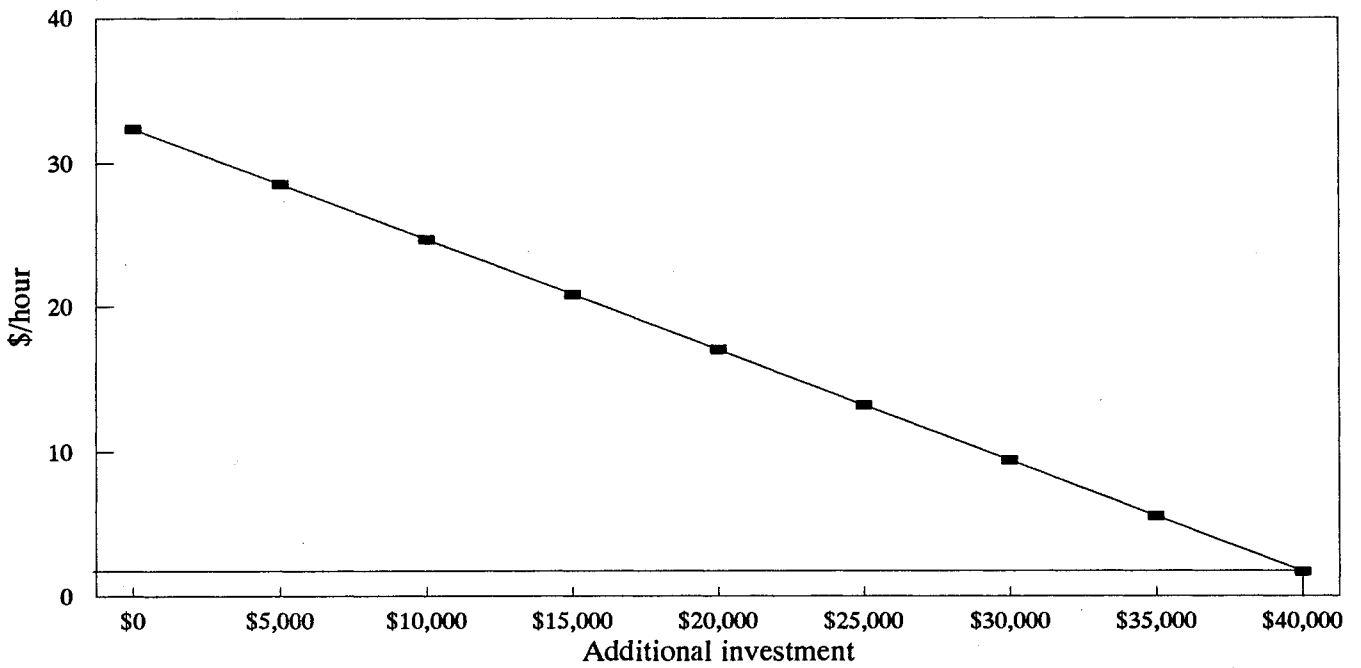


Figure 4. Adams County Model Farm Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Drylot Cow-calf to Baseline.

Cass County

Returns to overhead were the greatest with the farrow-to-finish swine enterprise included in the grain farm at the average price and high price livestock levels (Table 11). The pasture cow-calf and pasture ewe flock enterprises did not compete with the grain enterprises in Cass County. Adding drylot cows yields the greatest returns to overhead at low projected livestock prices. Increasing swine selling prices increased number of brood sows, which in turn increased corn and soybean acres at the expense of barley acres. When the confinement swine enterprise is added to the grain farm all barley produced on the farm is produced for feed, whereas only a small proportion of barley is produced for feed when the drylot cows are added to the grain farm. The remaining barley is sold on the cash market. Spring wheat acreage remained unchanged. Available labor limited the drylot cow herd size and the number of brood sows. For the drylot cow enterprise, labor was limiting in March, while the confinement swine enterprise labor was limiting the last three weeks of April.

Table 11. Annual Average Returns to Overhead for Cass County With Average, High, and Low Livestock Price Projections, 1992-1996

	Returns to <u>overhead</u> -----\$-----	<u>Cow-calf</u>		<u>Pasture</u>	<u>Farrow to</u>
		<u>pasture</u>	<u>drylot</u>	<u>ewe flock</u>	<u>finish-swine</u>
		-----head-----			
Average livestock prices					
Grain farm	93,252	0	0	0	0
Grain farm with pasture cow-calf	93,252	0	0	0	0
Grain farm with drylot cow-calf	121,120	0	177	0	0
Grain farm with ewe flock	93,252	0	0	0	0
Grain farm with confinement swine	125,337	0	0	0	98
High livestock prices					
Grain farm with drylot cow-calf	123,170	0	177	0	0
Grain farm with confinement swine	142,377	0	0	0	100
Low livestock prices					
Grain farm with drylot cow-calf	119,079	0	177	0	0
Grain farm with confinement swine	108,662	0	0	0	92

Five-year cash flow analysis indicated the baseline grain farm resulted in the greatest cumulative cash flow (Table 12). The grain farm with confinement swine had a better return to equity per hour of owner labor than drylot cows (Table 13). A \$40,000 additional investment would result in a return per hour of about \$5 for the drylot cow enterprise versus about \$20 for the farrow-to-finish enterprise (Figures 5 and 6).

Table 12. Cass County Model Farm Five-year Cash Flow for Grain Farm, Grain Farm Combined With Drylot Cow-calf, and Grain Farm Combined With Farrow-to-finish Swine, 1992-1996

Year ^a	Cumulative total					
	0	1992	1993	1994	1995	1996
	-----\$-----					
Grain farm	54,351	114,254	177,988	247,800	326,812	413,837
Grain farm with drylot cow-calf	52,418	68,490	120,205	177,450	237,821	303,198
Grain farm with farrow-to-finish swine	54,351	48,182	104,992	189,346	296,557	399,598

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

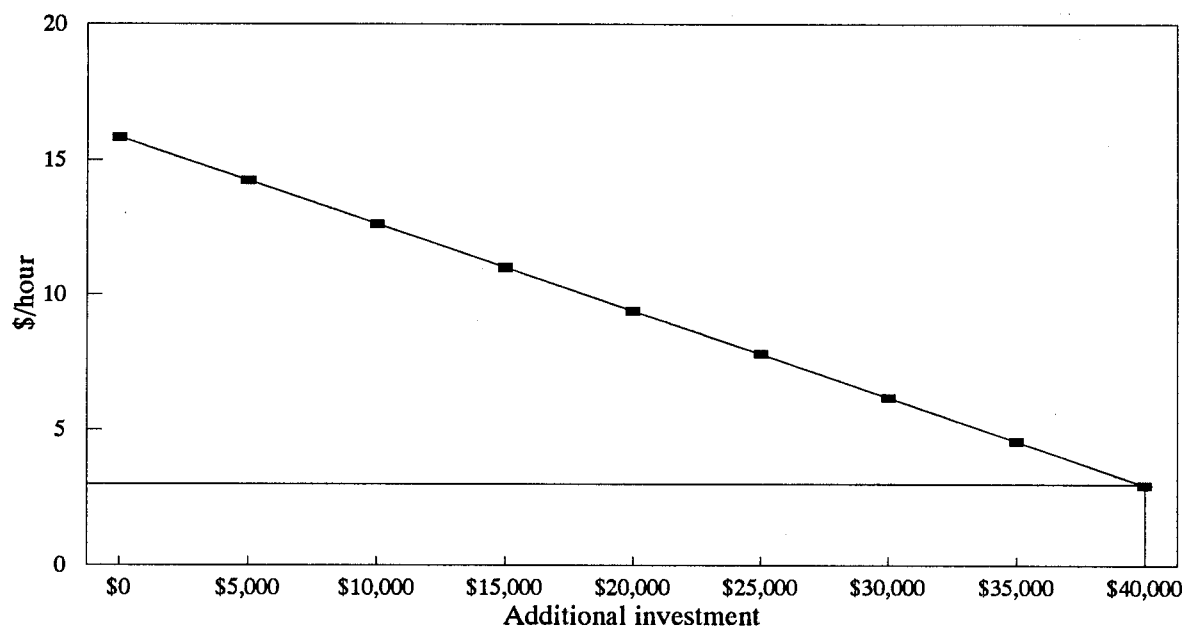


Figure 5. Cass County Model Farm Equity Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Drylot Cow-calf Enterprise to Baseline Farm.

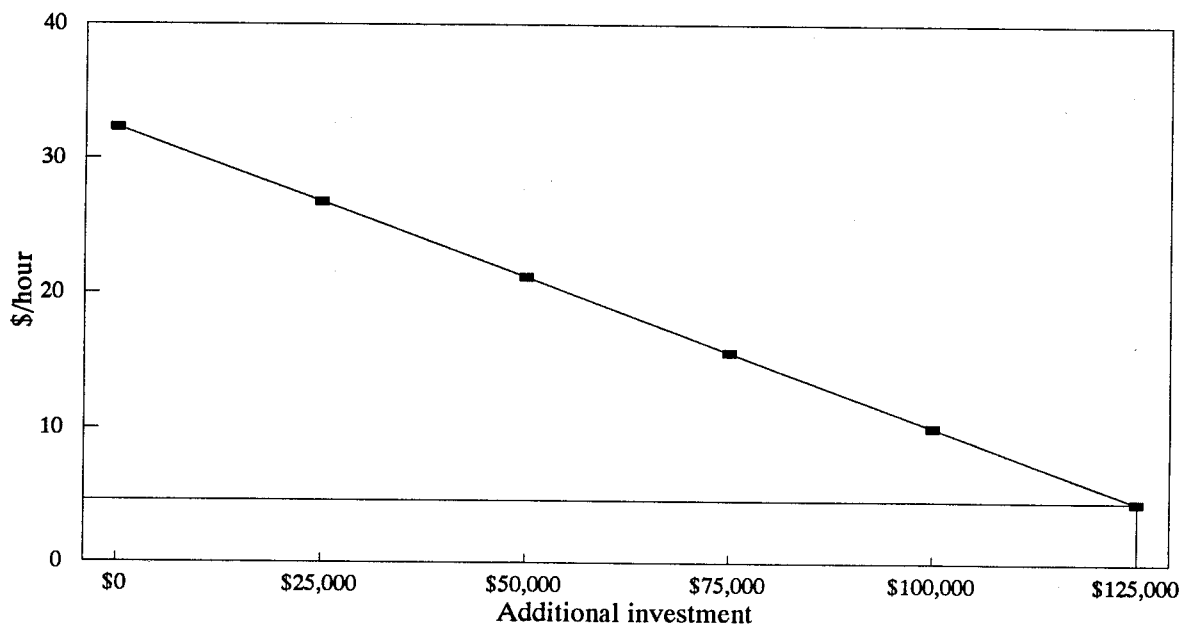


Figure 6. Cass County Model Farm Equity Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Confinement Swine Enterprise to Baseline Farm.

Table 13. Change in Owner's Equity, Owner Labor Requirements, and Marginal Returns to Owner for Cass County Model Grain Farm and Grain Farm With Livestock Incorporated

<u>Farm type</u>	<u>Change in owner's equity</u>	<u>Owner labor per year</u> hours	<u>Change in ending equity per additional hour of owner labor</u> ^a \$/hour
Grain farm	n/a	551	n/a
Grain farm and drylot cows	\$14,374	1,528	2.94
Grain farm and confinement swine	\$32,469	1,971	4.57

^a Change in equity divided by change in total owner labor for 5 years.

Foster County

The farrow-to-finish swine enterprise and drylot cows resulted in returns to overhead significantly greater than returns to overhead for the grain farm alone (Table 14). Adding the pasture cow and pasture ewe enterprises to the grain farm was not feasible as returns to overhead were increased by only \$2,070 and \$3,007, respectively. The farrow-to-finish swine enterprise incorporated with the grain farm resulted in the greatest returns at the high livestock price level; however, the drylot cow enterprise resulted in the highest returns at the low price level. As the swine selling prices were increased from low to high, the number of brood sows increased by 32 head. Acreage of corn and barley increased to the limit of the farm program acres. Acres of spring wheat decreased. From the baseline model to the low sheep price model, 173 acres of tilled cropland were placed into permanent pasture and alfalfa hay production. Spring wheat and sunflower acreage remained the same; however, barley decreased to the 22 acres required for feed production. As the price of sheep increased, sunflowers and barley dropped from the solution set, and wheat acreage remained the same. At higher sheep prices, all barley for feed was purchased. Labor during the calving period, March 1 to 31, limited the number of drylot cows. Labor, during the middle two weeks of April, limited the number of brood sows in the confinement swine enterprise. At high swine prices, the number of broods sows increased; however, 174 acres of cropland were not used.

Table 14. Annual Average Returns to Overhead for Foster County With Average, High, and Low Livestock Price Projections, 1992-1996

	Returns to <u>overhead</u> -----\$-----	<u>Cow-calf</u>		<u>Pasture</u>	<u>Farrow-to-</u>
		<u>pasture</u>	<u>drylot</u>	<u>ewe flock</u>	<u>finish swine</u>
		-----head-----			
Average livestock prices					
Grain farm	66,392	0	0	0	0
Grain farm with pasture cow-calf	68,462	26	0	0	0
Grain farm with drylot cow-calf	97,605	0	177	0	0
Grain farm with ewe flock	69,399	0	0	155	0
Grain farm with confinement swine	98,730	0	0	0	67
High livestock prices					
Grain farm with pasture cow-calf	68,785	26	0	0	0
Grain farm with drylot cow-calf	99,655	0	177	0	0
Grain farm with ewe flock	72,027	0	0	414	0
Grain farm with confinement swine	110,948	0	0	0	98
Low livestock prices					
Grain farm with pasture cow-calf	68,140	26	0	0	0
Grain farm with drylot cow-calf	95,564	0	177	0	0
Grain farm with ewe flock	67,894	0	0	155	0
Grain farm with confinement swine	87,328	0	0	0	66

Cash flow analysis of the Foster County model farm showed that the farrow-to-finish swine operation incorporated with the grain farm resulted in the highest cumulative returns after five years (Table 15). Cumulative returns after five years were increased by 115 percent over cumulative returns for the grain farm without livestock. Returns to equity per hour of owner labor were highest with the combination grain farm and farrow-to-finish swine (Table 16). Return to equity per hour of owner labor approach \$20 per hour as additional capital investment in additional facilities approaches zero for the drylot cow enterprise (Figures 7 and 8).

Table 15. Foster County Model Farm Five-year Cash Flow and Ending Equity for Grain Farm, and Grain Farm Combined With Drylot Cow-calf, and Grain Farm Combined With Farrow-to-Finish Swine, 1992-1996

Year ^a	Cumulative total					
	0	1992	1993	1994	1995	1996
	-----\$-----					
Grain farm	27,468	55,414	87,263	122,180	162,144	206,199
Grain farm with drylot cow-calf	22,406	9,488	32,138	57,659	83,243	110,458
Grain farm with farrow-to-finish swine	27,468	14,751	46,365	95,992	160,460	221,315

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

Table 16. Change in Owner's Equity, Owner Labor Requirements, and Marginal Returns to Owner for Foster County Model Grain Farm and Grain Farm With Livestock Incorporated

<u>Farm type</u>	<u>Change in owner's equity</u>	<u>Owner labor per year</u> hours	<u>Change in ending equity per additional hour of owner labor</u> ^a \$/hour
Grain farm	n/a	658	n/a
Grain farm and drylot cows	\$29,273	1,626	6.05
Grain farm and confinement swine	\$61,824	2,027	9.03

^a Change in equity divided by change in total owner labor for 5 years.

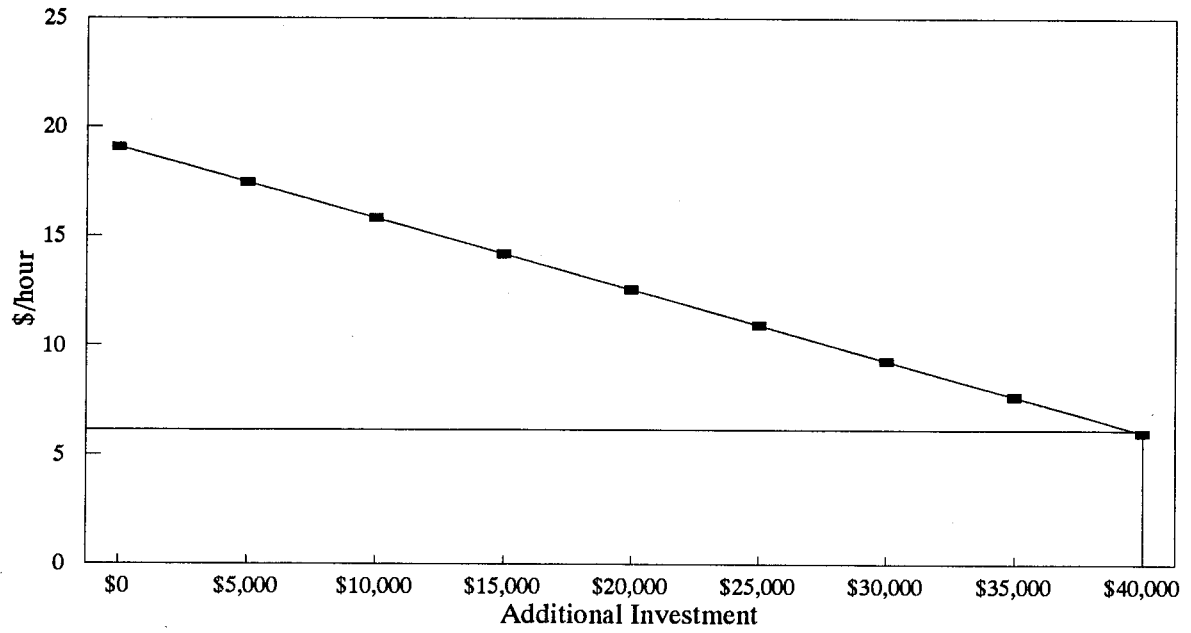


Figure 7. Foster County Model Farm Equity Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Drylot Cow-calf Enterprise to Baseline Farm.

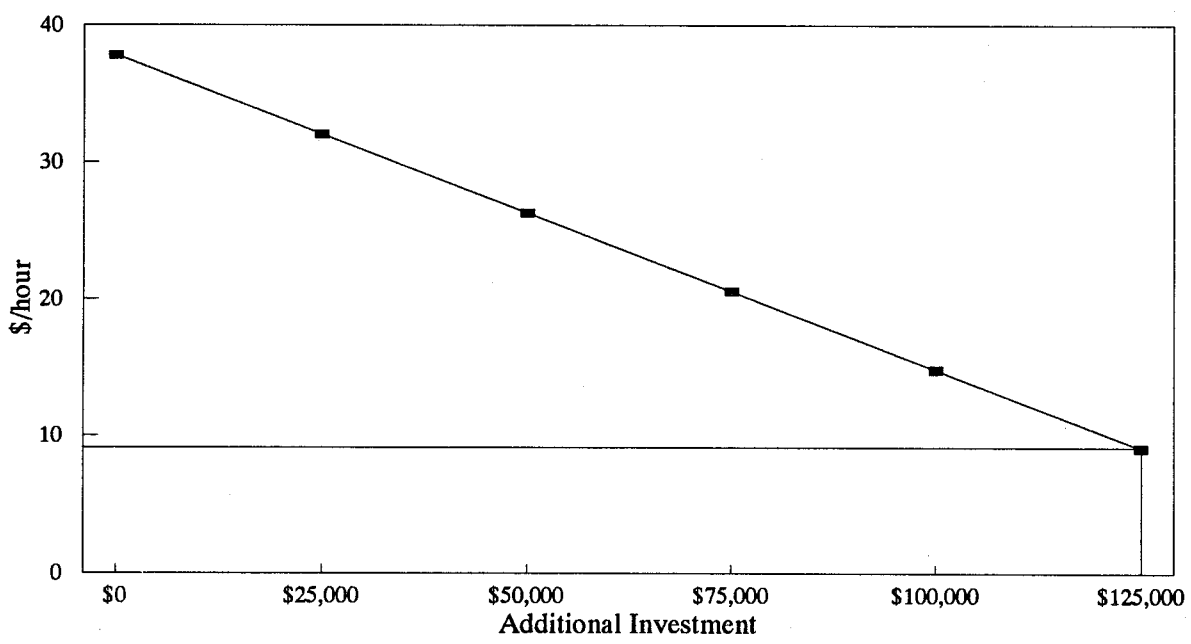


Figure 8. Foster County Model Farm Equity Returns to Owner Labor at Different Levels of Required Additional Investment for Adding a Confinement Swine Enterprise to Baseline Farm.

ESTIMATION OF FARM NUMBERS TO ADOPT A LIVESTOCK ENTERPRISE

North Dakota had 28,297 farms with greater than \$10,000 in sales in 1987 (Table 17) (Bureau of the Census, 1987). Not all farms are suited to adding livestock to their operation. Some grain farms are using their entire existing labor supply or may have off-farm employment. Others may not have the management expertise or resources required to incorporate livestock into their farming system. Estimating those farms that do not have livestock and would be willing to add livestock is difficult. There are 15,637, 26,225, and 26,998 farms that do not produce beef, hogs, or sheep, respectively (Table 17). The central region has the greatest number of farms that could consider adding livestock to their farm (Table 17). A breakdown of farm numbers by county is shown in Appendix D.

Table 17. Total Number of Farms and Number of Farms That Do Not Have Beef Cows, Hogs, and Sheep, By Region, 1987

<u>Region</u>	<u>Total farms</u>	<u>Number of farms not producing</u>		
		<u>Beef cows</u>	<u>Hogs and pigs</u>	<u>Sheep and lambs</u>
Western ND	10,504	3,948	9,515	9,844
Central ND	12,230	7,177	11,439	11,730
Eastern ND	<u>5,563</u>	<u>4,512</u>	<u>5,271</u>	<u>5,424</u>
Total	28,297	15,637	26,225	26,998

Source: Bureau of the Census 1987.

SUMMARY

Counties in North Dakota were placed into three different regions: western, central, and eastern. A linear programming model farm was developed for each region to determine the feasibility of adding a livestock enterprise to the farm. The livestock enterprises considered were beef cow-calf on pasture, beef cow-calf in confinement, ewe flock on pasture, and total confinement farrow-to-finish swine. Enterprise budgets were estimated, using price projections from 1992 through 1996. A five-year projected cash flow was developed for the grain farm-livestock combinations determined to be feasible, using the linear programming model.

The baseline farm, with drylot cow enterprise included, resulted in the greatest return to overhead in Adams County. Next highest returns to overhead resulted with the baseline farm combined with the confinement swine enterprise. The greatest cumulative cash flow in Adams County resulted with the baseline model; however, the greatest equity is slightly better (\$8,600) with the combination baseline farm and farrow-to-finish hog operation. Increased returns to equity per hour of owner labor with the farrow-to-finish operation added were slight.

Farrow-to-finish swine had the greatest returns to overhead of the livestock species considered in the Cass County model farm. Cumulative returns to land, owner labor, and management for the farrow-to-finish swine alternative exceeded all other alternatives after four years. Owner labor requirements for the farrow-to-finish swine alternative were increased by 3.6 times over the grain farm alone. Average return per hour of owner labor was \$36.69 per hour with the farrow-to-finish swine operation.

Farrow-to-finish swine had the greatest returns to overhead of the livestock species considered in the Foster County model farm. Cumulative returns to land, owner labor, and management for the farrow-to-finish swine were nearly equal to the grain farm alone after three years and exceeded the grain farm's cumulative returns by 133 percent after five years. Owner-labor requirements for the farrow-to-finish swine alternative were increased by 3.1 times over the grain farm alone. Average return per hour of owner labor was \$21.36 per hour with the farrow-to-finish swine operation.

The western region had the potential to include hogs on a number of farms. While 62 percent of farms in western North Dakota already have beef cows on the farm, only 9 percent have hogs. The central region of North Dakota has the greatest number of farmers with the potential to include either a confinement beef cow-calf or farrow-to-finish swine operation on their grain farm. The eastern region of North Dakota has the greatest potential to include a farrow-to-finish swine operation.

REFERENCES

- Aakre, Dwight and Ron Haugen. 1991. Estimated 1991 Crop Budgets for South Valley, South Central, and South West Regions of North Dakota, Farm Management Planning Guide. North Dakota State University Extension Service. North Dakota State University, Fargo.
- Agricultural Stabilization and Conservation Service, United States Department of Agriculture Cass, Foster, and Adams Counties. 1992.
- Agweek. "Interest rates." Agweek. March 2, 1992. p. 39.
- Anderson, Vern. Superintendent of Animal Science Unit at Carrington Research Extension Center. Carrington, North Dakota. Personal communication. January 1992.
- Bangsund, Dean A., and F. Larry Leistritz. October 1991. Economic Impact of Leafy Spurge in Montana, South Dakota, and North Dakota. Agricultural Economics Department, North Dakota State University, Fargo. AER 275.
- Bureau of the Census. Census of Agriculture, 1987. State of North Dakota and County Data. U.S. Department of Commerce. Washington, DC.
- Crenshaw, Joe D. Associate professor of Animal and Range Sciences. North Dakota State University, Fargo. Personal communication. January 1992.
- Edwardson, Steven E., and Harlan G. Hughes. March 1988. COMPBUD - a Computerized Crop Budget Generator for North Dakota Agriculture. North Dakota State University Extension Service, Fargo. Version 1.0, Software User Guide 5.
- Food and Agricultural Policy Research Institute (FAPRI). Baseline 1992. Iowa State University, Ames, and University of Missouri-Columbia.
- Haugen, Roger G. Extension livestock specialist. Fargo, North Dakota. Personal communication. January 1992.
- Hughes, Harlan. September 24, 1990. Project P.I.G.S. Farrow-to-Finish Feasibility. North Dakota State University Extension Service, North Dakota State University, Fargo. Ver. 2.1.
- Hughes, Harlan. 1991. Beef Cow Production Planner, Beef Cow Herd Selling Weaned Calves in Fall. North Dakota State University Extension Service, North Dakota State University, Fargo. Ver. 3.0.

- Hughes, Harlan, and Dan Nudell. 1991. Ewe Flock Cost and Return Budget for Lambing Year. North Dakota State University Extension Service, North Dakota State University, Fargo.
- Johnson, Roger G., Dean A. Bangsund, and Dwain W. Meyer. 1990. 1989 Progress Report, Evaluation of Herbaceous Biomass Crops in the Northern Great Plains - Economic Analysis. North Dakota Agricultural Experiment Station, North Dakota State University, Fargo.
- North Dakota Agricultural Statistics Service. 1990. Custom Farm Work Rates, Early Field Operations, North Dakota, 1989. North Dakota State University and United States Department of Agriculture. Fargo.
- North Dakota Agricultural Statistics Service. 1991. North Dakota Agricultural Statistics. North Dakota State University and United States Department of Agriculture. Fargo.
- North Dakota Agricultural Statistics Service. 1990. North Dakota Agricultural Statistics. North Dakota State University and United States Department of Agriculture. Fargo.
- North Dakota Farm Business Management Education - State Averages. Annual Report 1990. North Dakota State Board for Vocational Education. Bismarck.
- Omodt, Hollis W., D.D. Patterson, and Ordell P. Olson. 1961. "General Soil Map, North Dakota." North Dakota Agricultural Experiment Station, Fargo.
- Petry, Timothy A. Associate Professor, Department of Agricultural Economics, North Dakota State University, Fargo. Personal communication. February 1992.
- Sell, Randall S. and David L. Watt. 1991. "LISA Drylot Sheep Combined with Minimum-Till and Conventional Grain Farm Management." Evaluation of Low-input Crop/Livestock Production Systems. Final Report, October 1991. North Dakota State University, Fargo, in cooperation with University of Illinois, Purdue; University of Missouri, Columbia; Kirschenmann Family Farms, Windsor, ND; and Jim and Sharon Ludwig, New Rockford, ND.
- Sell, Randall S. and David L. Watt. 1991. "LISA Drylot Cow/calf Combined with Minimum-Till and Conventional Grain Farm Management." Evaluation of Low-input Crop/Livestock Production Systems. Final Report, October 1991. North Dakota State University, Fargo, in cooperation with University of Illinois, Purdue; University of Missouri, Columbia; Kirschenmann Family Farms, Windsor, ND; and Jim and Sharon Ludwig, New Rockford, ND.

Toman, Norman, Jay Fisher, and Frank Sobolik. 1987. Determining an Economic Fertility Level. Cooperative Extension Service Publication SF-939, North Dakota State University, Fargo.

United States Department of Agriculture, National Agricultural Statistics Service. June 1991. Agricultural Prices 1990 Summary. Agricultural Statistics Board, Washington, DC.

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APPENDIX A
ESTIMATED CROP AND LIVESTOCK PRICES

APPENDIX TABLE A1. ESTIMATED CROP PRICES FOR ADAMS, CASS, AND FOSTER COUNTIES *

Year	Adams County Prices			Cass County Prices			Foster County Prices		
	Wheat	Barley	Oats ^b	Wheat	Barley	Soybean	Wheat	Barley	Sunflower ^c
	-----\$/bushel-----								
1992	3.23	1.76	1.33	3.23	2.28	5.50	3.22	1.75	9.27
1993	2.87	1.78	1.34	2.87	2.30	5.34	2.86	1.77	9.02
1994	2.90	1.72	1.30	2.90	2.24	5.35	2.89	1.71	9.04
1995	3.15	1.84	1.39	3.15	2.36	5.62	3.14	1.83	9.46
1996	<u>3.32</u>	<u>1.79</u>	<u>1.35</u>	<u>3.32</u>	<u>2.31</u>	<u>5.65</u>	<u>3.31</u>	<u>1.78</u>	<u>9.51</u>
Average	3.09	1.77	1.34	3.09	2.30	5.49	3.08	1.76	9.26

* Crop price estimates based on FAPRI price projections 1992 TO 1996 (FAPRI 1992). Crop basis estimated based on difference between United States average price and Marketing District average price, 1986 to 1990.

^b Oats price estimated based on the ratio of oats to barley in the Adams County marketing district, 1986-1990.

^c Sunflower price estimated by regressing sunflower prices on soybean prices for the years 1980-1990. The regression formula R² was 0.71, and the formula was $0.23 + 0.71 * \text{soybean price/bushel}$.

APPENDIX TABLE A2. ESTIMATED LIVESTOCK PRICES FOR MODEL FARMS

<u>Year</u>	<u>Sheep*</u> --\$/cwt---	<u>Lamb*</u> --\$/cwt---	<u>Year</u>	<u>Feeder</u> <u>7-800lbs.</u>	<u>Commercial</u> <u>cows</u>	<u>Calves</u> <u>4-500 lbs</u>	<u>Slaughter</u> <u>hogs^b</u>	<u>Cull</u> <u>sows^b</u>
						-----\$/cwt-----		
1985	18.80	65.30	1992	87.04	51.55	94.89	41.08	36.25
1986	21.80	67.80	1993	85.43	50.71	95.17	44.98	42.43
1987	24.80	78.20	1994	83.76	47.32	97.64	52.04	49.13
1988	21.30	67.80	1995	80.68	43.79	94.69	56.71	51.00
1989	21.40	65.30	1996	<u>81.36</u>	<u>44.43</u>	<u>92.66</u>	<u>51.67</u>	<u>45.16</u>
1990	<u>20.80</u>	<u>51.20</u>	Avg.	83.65	47.56	95.01	49.30	44.79
Avg.	21.48	65.93						
High price	23.25	73.84	High price	86.05	50.72	96.60	51.85	47.01
Low price	19.71	58.02	Low price	81.26	44.40	93.43	40.74	36.58

* Sheep and lamb prices from 1985 through 1989 were used as forecasts of sheep prices for 1992 through 1996 consecutively from 1986 (Haugen 1992).

^b Fat hogs and cull sow prices used in model farms were reduced by \$3.00/cwt to represent the average basis between FAPRI prices and North Dakota prices (Petry 1992).

Source: Sheep and Lamb prices-North Dakota Agricultural Statistics, 1989, 1990, and 1991. Feeder calves-7-800lbs., Commercial cows, Feeder calves-500 lbs., Fat hogs, and Cull Sow prices (FAPRI 1992).

APPENDIX B
CROP AND FORAGE YIELDS BY COUNTY

APPENDIX TABLE B1. ADAMS, CASS, AND FOSTER COUNTIES, AVERAGE YIELDS, 1981 TO 1990

Year	Adams County yields					Cass County yields						Foster County yields					
	Wheat		Barly	Oats	Hay	Wheat		Barly	Sybean	Corn	Hay	Wheat		Snfl.	Corn	Hay	
	flw	rcrp				flw	rcrp					flw	rcrp				#/ac.
	-----bu./acre-----				tons	-----bu./acre-----					tons	-----bu./acre-----				tons	
1981	17.7	8.3	15.0	27.9	1.3	36.2	33.9	58.0	29.8	83.0	2.8	33.8	30.7	50.1	1270	84.1	1.8
1982	22.4	22.6	34.9	47.9	2.0	38.3	39.1	61.6	22.9	69.4	2.7	34.2	32.6	50.3	1270	49.8	2.4
1983	25.4	21.0	44.5	57.6	1.7	32.0	33.8	56.3	30.0	75.6	2.9	29.5	26.7	39.3	1070	64	1.7
1984	30.8	25.3	45.1	50.5	1.5	47.8	48.8	73.3	22.2	66.9	3.0	37.0	34.5	52.9	1130	60	2.1
1985	26.8	18.8	34.8	42.5	0.9	54.7	55.7	75.1	28.3	76.2	3.2	39.0	32.7	50.4	1110	36	1.7
1986	24.5	22.9	38.8	46.0	1.5	31.3	34.3	59.8	38.0	105.2	3.8	33.8	30.6	51.9	1370	80.1	2.3
1987	30.1	22.6	40.0	46.0	1.6	43.7	42.7	62.4	34.5	99.4	3.3	31.2	29.7	46.7	1210	84.4	2.3
1988	7.5	3.1	6.0	10.0	0.5	24.0	16.8	21.9	14.5	50.8	1.1	16.9	12.2	17.4	1050	53.6	0.9
1989	20.8	14.9	26.5	32.5	0.9	38.8	32.5	46.9	19.5	53.9	2.3	22.9	19.1	29.1	1210	59.3	1.2
1990	<u>20.8</u>	<u>11.7</u>	<u>21.7</u>	<u>27.0</u>	<u>1.1</u>	<u>53.6</u>	<u>50.8</u>	<u>65.0</u>	<u>28.0</u>	<u>84.4</u>	<u>2.3</u>	<u>51.3</u>	<u>46.3</u>	<u>67.9</u>	<u>1320</u>	<u>68.9</u>	<u>1.8</u>
Avg	22.7	17.1	30.7	38.8	1.3	40.0	38.8	58.0	26.8	76.5	2.7	33.0	29.5	45.6	1201	64.0	1.8

Source: North Dakota Agricultural Statistics, Various issues.

APPENDIX C
LIVESTOCK PRODUCTION COEFFICIENTS

APPENDIX TABLE C1. PRODUCTION COEFFICIENTS FOR CONVENTIONAL COW-CALF ENTERPRISE

	<u>Percent</u>
Culling rate	15
Death loss	1
Calves weaned/cows bred	93
Mature cow conception rate	90
Heifer conception rate	85
Transit shrinkage	4
	<u>Pounds</u>
Cow weight	1100
Bull weight	2000
Cull heifer weight	875
Weaning weight-steer	564
Weaning weight-heifer	527
Adams County farm produced feed requirements per cow	
Alfalfa hay	2.2 tons
Wheat straw	.9 tons
Barley	2.1 bushels
Pasture	5.2 AUMs
Cass County farm produced feed requirements per cow	
Alfalfa hay	2.2 tons
Wheat straw	.9 tons
Corn	1.5 bushels
Pasture	5.2 AUMs
Foster County farm produced feed requirements per cow	
Alfalfa hay	2.2 tons
Wheat straw	.9 tons
Barley	.9 bushels
Corn	.7 bushels
Pasture	5.2 AUMs

APPENDIX TABLE C2. PRODUCTION COEFFICIENTS FOR DRYLOT COW-CALF ENTERPRISE

	<u>Percent</u>
Culling rate	15
Death loss	1
Calves weaned/cows bred	93
Mature cow conception rate	90
Heifer conception rate	85
Transit shrinkage	4
	<u>Pounds</u>
Cow weight	1100
Bull weight	2000
Cull heifer weight	875
Weaning weight-steer	504
Weaning weight-heifer	472
Adams County farm produced feed requirements per cow	
Alfalfa hay	3.4 tons
Wheat straw	.8 tons
Barley	12.4 bushels
Cass County farm produced feed requirements per cow	
Alfalfa hay	3.4 tons
Wheat straw	.8 tons
Corn	4.4 bushels
Barley	6.6 bushels
Foster County farm produced feed requirements per cow	
Alfalfa hay	3.4 tons
Wheat straw	.8 tons
Barley	6.6 bushels
Corn	4.4 bushels

APPENDIX TABLE C3. PRODUCTION COEFFICIENTS FOR PASTURE EWE FLOCK ENTERPRISE

	<u>Percent</u>
Culling rate	15
Death loss	6
Lambs weaned/ewes bred	130
Transit shrinkage	4

	<u>Pounds</u>
Ewe weight	140
Wool/ewe	10
Ram weight	175
Selling weight-lamb	120

Adams County farm produced feed requirements per ewe

Alfalfa hay	.5 tons
Barley	6.7 bushels
Pasture	.69 AUMs
Wheat straw	.2 tons

Cass County farm produced feed requirements per ewe

Alfalfa hay	.5 tons
Barley	6.7 bushels
Pasture	.69 AUMs
Wheat straw	.2 tons

Foster County farm produced feed requirements per ewe

Alfalfa hay	.5 tons
Barley	6.7 bushels
Pasture	.69 AUMs
Wheat straw	.2 tons

APPENDIX TABLE C4. PRODUCTION COEFFICIENTS FOR FARROW-TO-FINISH SWINE ENTERPRISE

	<u>Percent</u>
Cull sows	30
Sow death loss	3
	<u>Pounds</u>
Cull sows	400
Cull boars	450
Slaughter pigs	240
Litters/sow/year	1.81
Slaughter pigs/sow/year	12.34
Adams County farm produced feed requirements per sow	
Barley	266.3 bushels
Cass County farm produced feed requirements per sow	
Barley	113.2 bushels
Corn	92.6 bushels
Foster County farm produced feed requirements per sow	
Barley	113.2 bushels
Corn	92.6 bushels

APPENDIX D ADAMS COUNTY GRAIN AND
FORAGE CROP ENTERPRISE BUDGETS

 FOR: HARD RED SPRING WHEAT ON FALLOW

INCOME		CASH COSTS PER ACRE
-Sale of Crop	22.7 Mkt. Yld. Goal	\$70.14
21 ASCS YLD		
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$70.14
	* RESOURCE COMMITMENT *	
DIRECT COSTS ON	30.645 BUSHEL/ACRE	
-Seed		\$4.50
-Herbicides		\$4.82
-Fungicides		\$1.00
-Insecticides		\$0.00
-Fertilizer		\$1.96
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$2.27
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$31.07
* COSTS ON A PER BUSHEL BASIS *		\$1.37

FOR: HARD RED SPRING WHEAT ON RECROP

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	17.1 Mkt. Yld. Goal	\$52.84
	21 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$52.84
		* RESOURCE COMMITMENT *
DIRECT COSTS ON	23.085 BUSHEL/ACRE	
-Seed		\$4.50
-Herbicides		\$4.82
-Fungicides		\$1.00
-Insecticides		\$0.00
-Fertilizer		\$1.50
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$1.71
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$30.05
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$22.79
* COSTS ON A PER BUSHEL BASIS *		\$1.76

FOR: BARLEY

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	30.7 Mkt. Yld. Goal	\$54.34
	31 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$54.34
* RESOURCE COMMITMENT *		
DIRECT COSTS ON 41.445 BUSHEL/ACRE		
-Seed		\$4.38
-Herbicides		\$4.82
-Fungicides		\$0.95
-Insecticides		\$0.00
-Fertilizer		\$1.73
-Crop Insurance		\$4.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$3.07
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$32.47
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$21.87
* COSTS ON A PER BUSHEL BASIS *		\$1.06

FOR: OATS

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	38.8 Mkt. Yld. Goal	\$51.99
	39 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$51.99
* RESOURCE COMMITMENT *		
DIRECT COSTS ON	52.38 BUSHEL/ACRE	
-Seed		\$5.00
-Herbicides		\$1.79
-Fungicides		\$0.95
-Insecticides		\$0.00
-Fertilizer		\$1.94
-Crop Insurance		\$4.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$3.88
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$31.08
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$20.91
* COSTS ON A PER BUSHEL BASIS *		\$0.80

FOR: ALFALFA HAY

GROSS INCOME	Grown for feed to livestock
	CASH COSTS PER ACRE
DIRECT COSTS	
-Seed	\$0.00
-Herbicides	\$0.00
-Fungicides	\$0.00
-Insecticides	\$0.00
-Fertilizer	\$0.00
-Crop Insurance	\$0.00
-Custom Work	\$4.37
-Fuel	\$0.00
-Lubrication	\$0.00
-Repairs	\$0.00
-Machinery/Tractor Rental	\$8.25
-Drying	\$0.00
-Hauling	\$3.90
-Hired labor (machine time + 10%)	\$0.00
	=====
TOTAL DIRECT COSTS	\$16.52
 * COSTS ON A PER TON BASIS *	 \$15.04

FOR: SUMMER FALLOW

	* RESOURCE COMMITMENT *	CASH COSTS PER ACRE
DIRECT COSTS ON	0 BUSHELS/ACRE	
-Seed		\$1.25
-Herbicides		\$0.00
-Fungicides		\$0.00
-Insecticides		\$0.00
-Fertilizer		\$0.00
-Crop Insurance		\$0.00
-Custom Work		\$0.00
-Fuel		\$5.05
-Lubrication		\$0.76
-Repairs		\$2.60
-Machinery/Tractor Rental		\$2.50
-Drying		\$0.00
-Hauling		\$0.10
		=====
TOTAL DIRECT COSTS		\$12.26
TOTAL ALL COSTS		\$12.26

APPENDIX E. CASS COUNTY CROP AND FORAGE ENTERPRISE BUDGETS

 FOR: HARD RED SPRING WHEAT ON FALLOW

INCOME		CASH COSTS PER ACRE
-Sale of Crop	40 Mkt. Yld. Goal	\$123.60
	35.1 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$123.60
	* RESOURCE COMMITMENT *	
DIRECT COSTS ON	54 BUSHELS/ACRE	
-Seed		\$6.75
-Herbicides		\$4.82
-Fungicides		\$1.00
-Insecticides		\$0.00
-Fertilizer		\$4.57
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$4.00
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$37.66
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$85.94
* COSTS ON A PER BUSHEL BASIS *		\$0.94

 FOR: HARD RED SPRING WHEAT ON RECROP

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	38.8 Mkt. Yld. Goal	\$119.89
	35.1 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$119.89
* RESOURCE COMMITMENT *		
DIRECT COSTS ON	52.38 BUSHELS/ACRE	
-Seed		\$6.75
-Herbicides		\$4.82
-Fungicides		\$1.00
-Insecticides		\$0.00
-Fertilizer		\$4.27
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$3.88
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$37.24
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$82.65
* COSTS ON A PER BUSHEL BASIS *		\$0.96

FOR: BARLEY

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	58 Mkt. Yld. Goal	\$133.40
	54.6 ASCS YLD	
-Crop Insurance		\$0.00
GROSS INCOME		=====
		\$133.40
* RESOURCE COMMITMENT *		
DIRECT COSTS ON	78.3 BUSHEL/ACRE	
-Seed		\$5.25
-Herbicides		\$4.82
-Fungicides		\$0.95
-Insecticides		\$0.00
-Fertilizer		\$10.69
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$5.80
-Hired labor (machine time + 10%)		\$0.00
TOTAL DIRECT COSTS		=====
		\$44.03
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$89.37
* COSTS ON A PER BUSHEL BASIS *		\$0.76

FOR: SOYBEANS

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	26.8 Mkt. Yld. Goal	\$147.13
	27 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$147.13
* RESOURCE COMMITMENT *		
DIRECT COSTS ON	36.18 (bu/ac)	
-Seed		\$10.64
-Herbicides		\$23.11
-Fungicides		\$0.00
-Insecticides		\$0.00
-Fertilizer		\$4.85
-Crop Insurance		\$5.00
-Custom Work		\$1.50
-Fuel		\$4.43
-Lubrication		\$0.66
-Repairs		\$6.38
-Machinery/Tractor Rental		\$0.00
-Drying		\$0.00
-Hauling		\$2.68
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$59.25
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$87.88
* COSTS ON A PER UNIT BASIS *		\$2.21

FOR: SUMMER FALLOW

		CASH COSTS PER ACRE
<hr/>		
INCOME		
-Sale of Crop	0 Mkt. Yld. Goal	\$0.00
	0 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$0.00
	* RESOURCE COMMITMENT *	
DIRECT COSTS ON	0 BUSHEL/ACRE	
-Seed		\$1.25
-Herbicides		\$0.00
-Fungicides		\$0.00
-Insecticides		\$0.00
-Fertilizer		\$0.00
-Crop Insurance		\$0.00
-Custom Work		\$0.00
-Fuel		\$5.05
-Lubrication		\$0.76
-Repairs		\$2.60
-Machinery/Tractor Rental		\$2.50
-Drying		\$0.00
-Hauling		\$0.10
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$12.26
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		(\$12.26)
<hr/>		

FOR: CORN GRAIN

GROSS INCOME	Grown for feed to livestock
	CASH COSTS PER ACRE
DIRECT COSTS ON	
-Seed	\$18.05
-Herbicides	\$22.53
-Fungicides	\$0.00
-Insecticides	\$14.09
-Fertilizer	\$12.90
-Crop Insurance	\$8.00
-Custom Work	\$7.00
-Fuel	\$8.61
-Lubrication	\$0.00
-Repairs	\$8.61
-Machinery/Tractor Rental	\$0.05
-Drying	\$7.65
-Hauling	\$7.65
-Hired labor (machine time + 10%)	\$0.00
	=====
TOTAL DIRECT COSTS	\$115.19

Adjustments for livestock project

1. Cost of operating corn head subtracted from machinery repairs (\$.91)
2. Rental charge for corn head added to custom work (\$6/a)

FOR: ALFALFA

GROSS INCOME	Grown for feed to livestock CASH COSTS PER ACRE
DIRECT COSTS	
-Seed	\$0.00
-Herbicides	\$0.00
-Fungicides	\$0.00
-Insecticides	\$0.00
-Fertilizer	\$0.00
-Crop Insurance	\$0.00
-Custom Work	\$4.37
-Fuel	\$0.00
-Lubrication	\$0.00
-Repairs	\$0.00
-Machinery/Tractor Rental	\$23.50
-Drying	\$0.00
-Hauling	\$8.10
-Hired labor (machine time + 10%)	\$0.00
	=====
TOTAL DIRECT COSTS	\$35.97
 * COSTS ON A PER TON BASIS *	 \$15.25

**APPENDIX F. FOSTER COUNTY GRAIN AND FORAGE
CROP ENTERPRISE BUDGETS**

 FOR: HARD RED SPRING WHEAT ON FALLOW

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	33 Mkt. Yld. Goal	\$101.64
	29.8 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$101.64
	* RESOURCE COMMITMENT *	
DIRECT COSTS ON	44.55 BUSHEL/ACRE	
-Seed		\$5.63
-Herbicides		\$4.82
-Fungicides		\$1.00
-Insecticides		\$0.00
-Fertilizer		\$9.70
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$3.30
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$40.97
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$60.67
* COSTS ON A PER BUSHEL BASIS *		\$1.24

 FOR: HARD RED SPRING WHEAT ON RECROP

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	29.5 Mkt. Yld. Goal	\$90.86
	29.8 ASCS YLD	
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$90.86
* RESOURCE COMMITMENT *		
DIRECT COSTS ON	39.825 BUSHEL/ACRE	
-Seed		\$5.63
-Herbicides		\$4.82
-Fungicides		\$1.00
-Insecticides		\$0.00
-Fertilizer		\$7.58
-Crop Insurance		\$3.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$2.95
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$38.50
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$52.36
* COSTS ON A PER BUSHEL BASIS *		\$1.30

FOR: BARLEY

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	45.6 Mkt. Yld. Goal	\$80.26
	42.5 ASCS YLD	
-Crop Insurance		\$0.00
GROSS INCOME		=====
		\$80.26
* RESOURCE COMMITMENT *		
DIRECT COSTS ON	61.56 BUSHELS/ACRE	
-Seed		\$5.25
-Herbicides		\$4.82
-Fungicides		\$0.95
-Insecticides		\$0.00
-Fertilizer		\$6.71
-Crop Insurance		\$4.00
-Custom Work		\$1.00
-Fuel		\$4.85
-Lubrication		\$0.73
-Repairs		\$6.89
-Machinery/Tractor Rental		\$0.05
-Drying		\$0.00
-Hauling		\$4.56
-Hired labor (machine time + 10%)		\$0.00
TOTAL DIRECT COSTS		=====
		\$39.81
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$40.45
* COSTS ON A PER BUSHEL BASIS *		\$0.87

FOR: OIL SUNFLOWER

		CASH COSTS PER ACRE
INCOME		
-Sale of Crop	1201 Mkt. Yld. Goal	\$111.21
-Crop Insurance		\$0.00
		=====
GROSS INCOME		\$111.21
	* RESOURCE COMMITMENT *	
DIRECT COSTS ON	1621.35 (lbs/ac)	
-Seed		\$13.20
-Herbicides		\$7.16
-Fungicides		\$0.00
-Insecticides		\$3.30
-Fertilizer		\$4.49
-Crop Insurance		\$5.00
-Custom Work		\$4.25
-Fuel		\$6.25
-Lubrication		\$0.94
-Repairs		\$6.65
-Machinery/Tractor Rental		\$0.05
-Drying		\$2.40
-Hauling		\$2.40
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$56.09
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		\$55.12
* COSTS ON A PER UNIT BASIS *		\$0.05

FOR: SUMMER FALLOW

	* RESOURCE COMMITMENT *	CASH COSTS PER ACRE
DIRECT COSTS ON	0 BUSHELS/ACRE	
-Seed		\$1.25
-Herbicides		\$0.00
-Fungicides		\$0.00
-Insecticides		\$0.00
-Fertilizer		\$0.00
-Crop Insurance		\$0.00
-Custom Work		\$0.00
-Fuel		\$5.05
-Lubrication		\$0.76
-Repairs		\$2.60
-Machinery/Tractor Rental		\$2.50
-Drying		\$0.00
-Hauling		\$0.10
-Hired labor (machine time + 10%)		\$0.00
		=====
TOTAL DIRECT COSTS		\$12.26
RETURN (TO UNPAID OP. LABOR + MGMT)		
-Over Direct Costs		(\$12.26)

FOR: ALFALFA HAY

GROSS INCOME	Grown for feed to livestock
DIRECT COSTS ON	
-Seed	\$0.00
-Herbicides	\$0.00
-Fungicides	\$0.00
-Insecticides	\$0.00
-Fertilizer	\$0.00
-Crop Insurance	\$0.00
-Custom Work	\$4.37
-Fuel	\$0.00
-Lubrication	\$0.00
-Repairs	\$0.00
-Machinery/Tractor Rental	\$19.00
-Drying	\$0.00
-Hauling	\$5.40
-Hired labor (machine time + 10%)	\$0.00
	=====
TOTAL DIRECT COSTS	\$27.88
* COSTS ON A PER TON BASIS *	\$19.35

FOR: CORN GRAIN

GROSS INCOME	Grown for feed to livestock
DIRECT COSTS ON	
-Seed	\$18.05
-Herbicides	\$22.53
-Fungicides	\$0.00
-Insecticides	\$0.00
-Fertilizer	\$9.37
-Crop Insurance	\$8.00
-Custom Work	\$7.00
-Fuel	\$8.61
-Lubrication	\$0.00
-Repairs	\$8.61
-Machinery/Tractor Rental	\$0.05
-Drying	\$6.40
-Hauling	\$6.40
-Hired labor (machine time + 10%)	\$0.00
	=====
TOTAL DIRECT COSTS	\$95.07
Adjustments for livestock project	
1. Cost of operating corn head subtracted from machinery repairs (\$.91)	
2. Rental charge for corn head added to custom work(\$6/a)	

APPENDIX G
ADAMS COUNTY MODEL FARM CASH FLOW

APPENDIX TABLE G1. ADAMS COUNTY MODEL FARM FIVE-YEAR CASH FLOW FOR GRAIN FARM COMBINED WITH PASTURE COW-CALF, 1992-1996

Year ^a	Grain farm with pasture cow-calf herd					
	0	1992	1993	1994	1995	1996
	Gross Revenue					
Wheat	34,795	34,716	35,013	34,988	34,782	34,641
Falw.Wht.	0	0	0	0	0	0
Barley	0	0	0	0	0	0
Oats	0	0	0	0	0	0
Sunflower	0	0	0	0	0	0
Corn	0	0	0	0	0	0
Tame alfalfa	0	0	0	0	0	0
Fallow	0	0	0	0	0	0
Planted pasture	0	0	0	0	0	0
Native pasture	0	0	0	0	0	0
Existing hay	0	0	0	0	0	0
Pasture cows	56,853	57,622	57,543	58,037	55,934	55,129
Drylot cows	0	0	0	0	0	0
Farr.to Fin.swine	0	0	0	0	0	0
Pasture ewe flock	0	0	0	0	0	0
Total	91,647	92,338	92,556	93,025	90,716	89,770
	Expenses					
Wheat	16,591	14,592	14,592	14,592	14,592	14,592
Falw.Wht.	36	0	0	0	0	0
Barley	442	440	444	430	458	447
Oats	0	0	0	0	0	0
Sunflower	0	0	0	0	0	0
Corn	0	0	0	0	0	0
Tame alfalfa	0	0	0	0	0	0
Fallow	313	313	313	313	313	313
Planted pasture	1,755	1,755	1,755	1,755	1,755	1,755
Native pasture	2,175	2,175	2,175	2,175	2,175	2,175
Existing hay	3,146	3,146	3,146	3,146	3,146	3,146
Pasture cows	9,938	9,938	9,938	9,938	9,938	9,938
Drylot cows	0	0	0	0	0	0
Farr.to Fin.swine	0	0	0	0	0	0
Pasture ewe flock	0	0	0	0	0	0
Hired labor	767	767	767	767	767	767
Interest	1,238	1,200	1,044	1,056	1,166	1,240
Net Returns	55,245	58,011	58,381	58,852	56,404	55,397
Overhead	(18,922)	(18,922)	(18,922)	(18,922)	(18,922)	(18,922)
Family living	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
Ret.Own.&Land	16,323	19,089	19,458	19,929	17,482	16,475
Cumm. Total	\$16,323	\$36,963	\$59,933	\$85,556	\$111,165	\$138,201

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX TABLE G2. ADAMS COUNTY MODEL FARM FIVE-YEAR CASH FLOW FOR GRAIN FARM COMBINED WITH PASTURE COW-CALF AND DRYLOT COW-CALF, 1992-1996

Grain farm with pasture and drylot cow-calf						
Year ^a	Gross Revenue					
	0	1992	1993	1994	1995	1996
wheat	\$8,031	\$34,716	\$35,013	\$34,988	\$34,782	\$34,641
flw. Wht.	\$33,235	\$0	\$0	\$0	\$0	\$0
Barley	\$3,632	\$2,216	\$295	\$375	\$214	\$281
oats	\$183	\$0	\$0	\$0	\$0	\$0
sunflower	\$0	\$0	\$0	\$0	\$0	\$0
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$0	\$0	\$0	\$0	\$0	\$0
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$38,060	\$38,575	\$38,522	\$38,853	\$37,445	\$36,906
drylot cows	\$0	\$54,934	\$54,837	\$55,224	\$53,193	\$52,461
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$0	\$0	\$0	\$0	\$0	\$0
total revenue	\$83,141	\$130,441	\$128,667	\$129,439	\$125,634	\$124,290
			Expenses			
wheat	\$3,368	\$14,592	\$14,592	\$14,592	\$14,592	\$14,592
flw. Wht.	\$13,547	\$0	\$0	\$0	\$0	\$0
Barley	\$2,066	\$1,567	\$1,798	\$1,791	\$1,805	\$1,799
oats	\$1,585	\$0	\$0	\$0	\$0	\$0
sunflower	\$0	\$0	\$0	\$0	\$0	\$0
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$4,902	\$344	\$344	\$344	\$344	\$344
planted pasture	\$334	\$372	\$372	\$372	\$372	\$372
native pasture	\$2,175	\$2,175	\$2,175	\$2,175	\$2,175	\$2,175
existing alfalfa	\$2,858	\$7,158	\$7,158	\$7,158	\$7,158	\$7,158
pasture cows	\$6,653	\$6,653	\$6,653	\$6,653	\$6,653	\$6,653
drylot cows	\$0	\$33,837	\$12,081	\$12,081	\$12,081	\$12,081
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$3,156	\$3,156	\$3,156	\$3,156	\$3,156	\$3,156
interest	\$1,471	\$2,929	\$1,752	\$1,761	\$1,878	\$1,948
returns over v.C.	\$41,026	\$57,659	\$78,587	\$79,358	\$75,420	\$74,012
Overhead	(\$18,922)	(\$39,272)	(\$39,272)	(\$39,272)	(\$39,272)	(\$39,272)
family living	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)
return to owner & land	\$2,103	(\$1,614)	\$19,315	\$20,086	\$16,148	\$14,740
cummulative total	\$2,103	\$690	\$20,070	\$42,062	\$62,206	\$82,856

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX TABLE G3. ADAMS COUNTY MODEL FARM FIVE-YEAR CASH FLOW FOR GRAIN FARM COMBINED WITH PASTURE COW-CALF AND PASTURE EWE FLOCK, 1992-1996

Grain farm with pasture cow-calf and pasture ewe flock						
Year ^a	Gross Revenue					
	0	1992	1993	1994	1995	1996
wheat	\$8,031	\$34,716	\$35,013	\$34,988	\$34,782	\$34,641
flw. Wht.	\$33,235	\$0	\$0	\$0	\$0	\$0
Barley	\$3,719	\$0	\$0	\$0	\$0	\$0
oats	\$183	\$0	\$0	\$0	\$0	\$0
sunflower	\$0	\$0	\$0	\$0	\$0	\$0
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$0	\$0	\$0	\$0	\$0	\$0
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$17,772	\$18,013	\$17,988	\$18,142	\$17,485	\$17,233
drylot cows	\$0	\$0	\$0	\$0	\$0	\$0
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$52,997	\$59,653	\$52,962	\$51,419	\$52,997
total revenue	\$62,940	\$105,725	\$112,654	\$106,092	\$103,686	\$104,872
			Expenses			
wheat	\$3,368	\$14,592	\$14,592	\$14,592	\$14,592	\$14,592
flw. Wht.	\$13,460	\$0	\$0	\$0	\$0	\$0
Barley	\$2,066	\$6,404	\$6,473	\$6,267	\$6,680	\$6,508
oats	\$1,585	\$0	\$0	\$0	\$0	\$0
sunflower	\$0	\$0	\$0	\$0	\$0	\$0
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$4,902	\$313	\$313	\$313	\$313	\$313
planted pasture	\$334	\$1,366	\$1,366	\$1,366	\$1,366	\$1,366
native pasture	\$2,175	\$2,175	\$2,175	\$2,175	\$2,175	\$2,175
existing alfalfa	\$2,858	\$4,511	\$4,511	\$4,511	\$4,511	\$4,511
pasture cows	\$3,107	\$3,107	\$3,107	\$3,107	\$3,107	\$3,107
drylot cows	\$0	\$0	\$0	\$0	\$0	\$0
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$30,320	\$9,245	\$9,245	\$9,245	\$9,245
hired labor	\$2,551	\$2,551	\$2,551	\$2,551	\$2,551	\$2,551
interest	\$1,270	\$2,730	\$1,576	\$1,579	\$1,708	\$1,773
returns over v.C.	\$25,264	\$37,655	\$66,745	\$60,387	\$57,439	\$58,731
Overhead	(\$18,922)	(\$4,137)	(\$20,993)	(\$20,993)	(\$20,993)	(\$20,993)
family living	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)
return to owner & land	(\$13,658)	\$13,519	\$25,752	\$19,394	\$16,446	\$17,739
cummulative total	(\$13,658)	(\$1,437)	\$24,179	\$45,870	\$66,674	\$90,746

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX H
CASS COUNTY MODEL FARM CASH FLOW

APPENDIX TABLE H1. CASS COUNTY MODEL FARM FIVE YEAR CASH FLOW FOR GRAIN FARM, 1992-1996

Grain farm						
Year*	Gross Revenue					
	0	1992	1993	1994	1995	1996
Wheat	55,289	55,713	54,741	54,822	55,497	55,956
Falw.wht.	5,576	5,624	5,513	5,522	5,599	5,652
Barley	40,416	40,338	40,389	40,235	40,543	40,415
Oats	0	0	0	0	0	0
Soybean	35,312	35,376	34,347	34,411	36,148	36,341
Corn	0	0	0	0	0	0
Tame alfalfa	0	0	0	0	0	0
Fallow	0	0	0	0	0	0
Planted pasture	0	0	0	0	0	0
Native pasture	0	0	0	0	0	0
Existing hay	0	0	0	0	0	0
Pasture cows	0	0	0	0	0	0
Drylot cows	0	0	0	0	0	0
Farr.to Fin.swine	0	0	0	0	0	0
Pasture ewe flock	0	0	0	0	0	0
Total	136,593	137,051	134,989	134,990	137,787	138,363
Expenses						
Wheat	13,619	13,619	13,619	13,619	13,619	13,619
Falw.wht.	1,356	1,356	1,356	1,356	1,356	1,356
Barley	12,335	12,335	12,335	12,335	12,335	12,335
Oats	0	0	0	0	0	0
soybean	14,220	14,220	14,220	14,220	14,220	14,220
Corn	0	0	0	0	0	0
Tame alfalfa	0	0	0	0	0	0
Fallow	439	439	439	439	439	439
Planted pasture	0	0	0	0	0	0
Native pasture	0	0	0	0	0	0
Existing hay	0	0	0	0	0	0
Pasture cows	0	0	0	0	0	0
Drylot cows	0	0	0	0	0	0
Farr.to Fin.swine	0	0	0	0	0	0
Pasture ewe flock	0	0	0	0	0	0
Hired labor	94	94	94	94	94	94
Interest	1,257	1,326	1,124	1,103	1,330	1,400
Net Returns	93,274	93,661	91,803	91,825	94,393	94,900
Overhead	(18,922)	(18,922)	(18,922)	(18,922)	(18,922)	(18,922)
Family living	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
Ret.Own.&Land	54,351	54,739	52,881	52,903	55,471	55,978
Cumm.total	\$54,351	\$114,254	\$177,988	\$247,800	\$326,812	\$413,837

* Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX TABLE H2. CASS COUNTY MODEL FARM FIVE YEAR CASH FLOW FOR GRAIN FARM
COMBINED WITH DRYLOT COW-CALF, 1992-1996

Grain Farm with drylot cow-calf						
Year ^a	Gross Revenue					
	0	1992	1993	1994	1995	1996
Wheat	\$55,289	\$55,713	\$54,741	\$54,822	\$55,497	\$55,956
flw.Wht.	\$5,576	\$5,624	\$5,513	\$5,522	\$5,599	\$5,652
Barley	\$40,416	\$37,678	\$37,706	\$37,622	\$37,789	\$37,719
oats	\$0	\$0	\$0	\$0	\$0	\$0
soybean	\$35,312	\$1,548	\$1,503	\$1,505	\$1,581	\$1,590
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$0	\$0	\$0	\$0	\$0	\$0
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$83,304	\$83,158	\$83,744	\$80,664	\$79,555
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$0	\$0	\$0	\$0	\$0	\$0
total revenue	\$136,593	\$183,866	\$182,620	\$183,215	\$181,131	\$180,472
			Expenses			
wheat	\$15,465	\$13,619	\$13,619	\$13,619	\$13,619	\$13,619
flw.Wht.	\$1,356	\$1,356	\$1,356	\$1,356	\$1,356	\$1,356
Barley	\$12,335	\$12,335	\$12,335	\$12,335	\$12,335	\$12,335
oats	\$0	\$0	\$0	\$0	\$0	\$0
soybean	\$14,220	\$622	\$622	\$622	\$622	\$622
corn	\$0	\$1,209	\$1,209	\$1,209	\$1,209	\$1,209
tame alfalfa	\$0	\$8,030	\$8,030	\$8,030	\$8,030	\$8,030
fallow	\$439	\$439	\$439	\$439	\$439	\$439
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$51,885	\$18,320	\$18,320	\$18,320	\$18,320
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$94	\$3,141	\$3,141	\$3,141	\$3,141	\$3,141
interest	\$1,344	\$3,729	\$1,931	\$1,910	\$2,138	\$2,208
returns over v.C.	\$91,340	\$87,501	\$121,617	\$122,234	\$119,921	\$119,193
Overhead	(\$18,922)	(\$56,409)	(\$56,409)	(\$56,409)	(\$56,409)	(\$56,409)
family living	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)
return to owner & land	\$52,418	\$11,093	\$45,209	\$45,825	\$43,513	\$42,784
cummulative total	\$52,418	\$68,490	\$120,205	\$177,450	\$237,821	\$303,198

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX TABLE H3. CASS COUNTY MODEL FARM FIVE YEAR CASH FLOW FOR GRAIN FARM COMBINED WITH FARROW-TO-FINISH SWINE, 1992-1996

Year ^a	Grain farm with farrow-to-finish swine					
	0	1992	1993	1994	1995	1996
Gross Revenue						
Wheat	\$55,289	\$55,713	\$54,741	\$54,822	\$55,497	\$55,956
flw. Wht.	\$5,576	\$5,624	\$5,513	\$5,522	\$5,599	\$5,652
Barley	\$40,419	\$2,251	\$2,063	\$2,626	\$1,501	\$1,970
oats	\$0	\$0	\$0	\$0	\$0	\$0
soybean	\$35,312	\$32,104	\$31,170	\$31,228	\$32,804	\$32,979
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$0	\$0	\$0	\$0	\$0	\$0
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$0	\$0	\$0	\$0	\$0
farrow to finish sows	\$0	\$115,199	\$127,354	\$148,780	\$162,625	\$147,193
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
total revenue	\$136,595	\$210,891	\$210,891	\$220,840	\$242,978	\$258,025
Expenses						
wheat	\$13,619	\$13,619	\$13,619	\$13,619	\$13,619	\$13,619
flw. Wht.	\$1,356	\$1,356	\$1,356	\$1,356	\$1,356	\$1,356
Barley	\$12,337	\$8,450	\$8,450	\$8,450	\$8,450	\$8,450
oats	\$0	\$0	\$0	\$0	\$0	\$0
soybean	\$14,220	\$12,905	\$12,905	\$12,905	\$12,905	\$12,905
corn	\$0	\$13,721	\$13,721	\$13,721	\$13,721	\$13,721
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$439	\$438	\$438	\$438	\$438	\$438
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$0	\$0	\$0	\$0	\$0
farrow to finish sows	\$0	\$62,706	\$42,566	\$42,566	\$42,566	\$42,566
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$94	\$12,536	\$12,536	\$12,536	\$12,536	\$12,536
interest	\$1,257	\$5,350	\$4,186	\$4,177	\$4,381	\$4,460
returns over v.C.	\$93,273	\$79,810	\$111,063	\$133,210	\$148,054	\$133,698
Overhead	(\$18,922)	(\$71,143)	(\$38,831)	(\$38,831)	(\$38,831)	(\$38,831)
family living	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)
return to owner & land	\$54,351	(\$11,332)	\$52,233	\$74,379	\$89,223	\$74,868
cummulative total	\$54,351	\$48,182	\$104,992	\$189,346	\$296,557	\$399,598

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX I
FOSTER COUNTY MODEL FARM CASH FLOW

APPENDIX TABLE II. FOSTER COUNTY MODEL FARM FIVE YEAR CASH FLOW FOR GRAIN FARM, 1992-1996

Grain farm							
Year*	Gross Revenue						
	0	1992	1993	1994	1995	1996	
Wheat	63,551	61,588	63,272	63,318	63,700	63,961	
Falw.wht.	5,000	4,859	4,950	4,957	5,019	5,061	
Barley	13,899	13,935	13,959	13,887	14,030	13,970	
Oats	0	0	0	0	0	0	
Sunflower	30,027	30,060	29,249	29,314	30,676	30,838	
Corn	0	0	0	0	0	0	
Tame alfalfa	0	0	0	0	0	0	
Fallow	0	0	0	0	0	0	
Planted pasture	0	0	0	0	0	0	
Native pasture	0	0	0	0	0	0	
Existing hay	0	0	0	0	0	0	
Pasture cows	0	0	0	0	0	0	
Drylot cows	0	0	0	0	0	0	
Farr.to Fin.sow	0	0	0	0	0	0	
pastured ewes	0	0	0	0	0	0	
Total	112,477	110,441	111,429	111,477	113,425	113,830	
			Expenses				
Wheat	20,836	20,836	20,836	20,836	20,836	20,836	
Falw.wht.	1,598	1,598	1,598	1,598	1,598	1,598	
Barley	6,338	6,338	6,338	6,338	6,338	6,338	
Oats	0	0	0	0	0	0	
Sunflower	15,144	15,144	15,144	15,144	15,144	15,144	
Corn	0	0	0	0	0	0	
Tame alfalfa	0	0	0	0	0	0	
Fallow	475	475	475	475	475	475	
Planted pasture	0	0	0	0	0	0	
Native pasture	0	0	0	0	0	0	
Existing hay	0	0	0	0	0	0	
Pasture cows	0	0	0	0	0	0	
Drylot cows	0	0	0	0	0	0	
Farr.to Fin.sow	0	0	0	0	0	0	
pastured ewes	0	0	0	0	0	0	
Hired labor	364	364	364	364	364	364	
Interest	1,331	1,426	1,167	1,172	1,390	1,500	
Net Returns	66,390	64,259	65,507	65,549	67,279	67,574	
Overhead	(18,922)	(18,922)	(18,922)	(18,922)	(18,922)	(18,922)	
Family living	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	
Ret.Own.&Land	27,468	25,337	26,584	26,627	28,357	28,651	
Cumm. Total	\$27,468	\$55,414	\$87,263	\$122,180	\$162,144	\$206,199	

* Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX TABLE 12. FOSTER COUNTY MODEL FARM FIVE YEAR CASH FLOW FOR GRAIN FARM COMBINED WITH DRYLOT COW-CALF, 1992-1996

Year ^a	Grain farm with drylot cow-calf					
	0	1992	1993	1994	1995	1996
	Gross Revenue					
wheat	\$63,551	\$61,588	\$63,272	\$63,318	\$63,700	\$63,961
flw. Wht.	\$5,000	\$4,859	\$4,950	\$4,957	\$5,019	\$5,061
Barley	\$13,899	\$0	\$0	\$0	\$0	\$0
oats	\$0	\$0	\$0	\$0	\$0	\$0
sunflower	\$30,027	\$13,349	\$12,989	\$13,018	\$13,622	\$13,694
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$0	\$0	\$0	\$0	\$0	\$0
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$83,304	\$83,158	\$83,744	\$80,664	\$79,555
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$0	\$0	\$0	\$0	\$0	\$0
total revenue	\$112,477	\$163,099	\$164,369	\$165,037	\$163,006	\$162,271
	Expenses					
wheat	\$23,602	\$20,836	\$20,836	\$20,836	\$20,836	\$20,836
flw. Wht.	\$1,598	\$1,598	\$1,598	\$1,598	\$1,598	\$1,598
Barley	\$8,505	\$2,155	\$2,178	\$2,108	\$2,248	\$2,190
oats	\$0	\$0	\$0	\$0	\$0	\$0
sunflower	\$15,144	\$6,725	\$6,725	\$6,725	\$6,725	\$6,725
corn	\$0	\$1,131	\$1,131	\$1,131	\$1,131	\$1,131
tame alfalfa	\$0	\$9,635	\$9,635	\$9,635	\$9,635	\$9,635
fallow	\$375	\$375	\$375	\$375	\$375	\$375
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$52,004	\$18,320	\$18,320	\$18,320	\$18,320
farrow to finish sows	\$0	\$0	\$0	\$0	\$0	\$0
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$364	\$3,268	\$3,268	\$3,268	\$3,268	\$3,268
interest	\$1,560	\$4,010	\$2,146	\$2,165	\$2,355	\$2,478
returns over v.C.	\$61,329	\$61,362	\$98,157	\$98,876	\$96,515	\$95,716
Overhead	(\$18,922)	(\$56,409)	(\$56,409)	(\$56,409)	(\$56,409)	(\$56,409)
family living	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)
return to owner & land	\$22,406	(\$15,047)	\$21,748	\$22,468	\$20,107	\$19,307
cummulative total	\$22,406	\$9,488	\$32,138	\$57,659	\$83,243	\$110,458

^a Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

APPENDIX TABLE I3. FOSTER COUNTY MODEL FARM FIVE YEAR CASH FLOW FOR GRAIN FARM COMBINED FARROW-TO-FINISH SWINE, 1992-1996

Grain farm with farrow-to-finish swine						
Year*	Gross Revenue					
	0	1992	1993	1994	1995	1996
wheat	\$63,551	\$61,588	\$63,272	\$63,318	\$63,700	\$63,961
flw.Wht.	\$5,000	\$4,859	\$4,950	\$4,957	\$5,019	\$5,061
Barley	\$13,899	\$873	\$800	\$1,018	\$582	\$764
oats	\$0	\$0	\$0	\$0	\$0	\$0
sunflower	\$30,027	\$30,060	\$29,249	\$29,314	\$30,676	\$30,838
corn	\$0	\$0	\$0	\$0	\$0	\$0
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$0	\$0	\$0	\$0	\$0	\$0
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$0	\$0	\$0	\$0	\$0
farrow-to-finish sows	\$0	\$77,883	\$86,100	\$100,586	\$109,945	\$99,513
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
total revenue	\$112,478	\$175,262	\$184,371	\$199,193	\$209,923	\$200,136
			Expenses			
wheat	\$20,836	\$20,836	\$20,836	\$20,836	\$20,836	\$20,836
flw.Wht.	\$1,598	\$1,598	\$1,598	\$1,598	\$1,598	\$1,598
Barley	\$6,339	\$9,724	\$9,787	\$9,597	\$9,977	\$9,819
oats	\$0	\$0	\$0	\$0	\$0	\$0
sunflower	\$15,144	\$15,144	\$15,144	\$15,144	\$15,144	\$15,144
corn	\$0	\$8,893	\$8,893	\$8,893	\$8,893	\$8,893
tame alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
fallow	\$435	\$435	\$435	\$435	\$435	\$435
planted pasture	\$0	\$0	\$0	\$0	\$0	\$0
native pasture	\$0	\$0	\$0	\$0	\$0	\$0
existing alfalfa	\$0	\$0	\$0	\$0	\$0	\$0
pasture cows	\$0	\$0	\$0	\$0	\$0	\$0
drylot cows	\$0	\$0	\$0	\$0	\$0	\$0
farrow-to-finish sows	\$0	\$42,515	\$28,778	\$28,778	\$28,778	\$28,778
pasture ewe flock	\$0	\$0	\$0	\$0	\$0	\$0
hired labor	\$364	\$6,425	\$6,425	\$6,425	\$6,425	\$6,425
interest	\$1,329	\$4,341	\$3,430	\$3,433	\$3,656	\$3,764
returns over v.C.	\$66,432	\$65,349	\$89,043	\$104,053	\$114,180	\$104,442
Overhead	(\$18,922)	(\$60,676)	(\$38,831)	(\$38,831)	(\$38,831)	(\$38,831)
family living	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)	(\$20,000)
return to owner & land	\$27,510	(\$15,327)	\$30,213	\$45,222	\$55,349	\$45,612
cummulative total	\$27,468	\$14,751	\$46,365	\$95,992	\$160,460	\$221,315

* Year 0 represents the establishment year for livestock enterprises requiring pasture and alfalfa establishment.

**APPENDIX J
NORTH DAKOTA GRAIN AND
LIVESTOCK FARM STATISTICS**

APPENDIX TABLE J1. NUMBER OF NORTH DAKOTA FARMS WITH GREATER THAN \$10,000 IN SALES WITH BEEF COWS, EWES AND LAMBS, HOGS AND PIGS, AND CROPLAND, 1987

	North Dakota farms with beef cows		North Dakota farms with ewes and lambs		North Dakota farms with hogs and pigs		North Dakota farms with cropland acres		Percent of farms with crop acres which have livestock		
	# Farms	# Beef cows	# Farms	#Ewes&Lambs	# Farms	# Hogs	# Farms	Cropland acres	Beef	Sheep	Hogs
<u>Western North Dakota Counties</u>											
Adams	213	18,361	36	3,008	52	11,400	328	599,306	64.94	10.98	15.85
Billings	168	18,413	24	1,217	9	1,506	209	776,211	80.38	11.48	4.31
Bowman	183	18,530	27	1,838	80	16,542	300	697,963	61.00	9.00	26.67
Burleigh	319	29,946	58	7,309	16	2,559	535	817,219	59.63	10.84	2.99
Divide	205	8,006	41	4,910	18	1,172	491	699,941	41.75	8.35	3.67
Dunn	469	44,960	54	3,521	22	3,073	579	966,405	81.00	9.33	3.80
Emmons	392	26,304	66	3,954	18	1,090	708	816,533	55.37	9.32	2.54
Golden Valley	110	13,253	22	2,419	20	3,346	202	502,596	54.46	10.89	9.90
Grant	433	37,798	118	16,593	41	4,812	590	992,744	73.39	20.00	6.95
Hettinger	231	12,714	40	9,104	11	515	435	696,591	53.10	9.20	2.53
Logan	304	20,820	20	2,175	9	1,506	455	570,468	66.81	4.40	1.98
McIntosh	296	17,241	26	1,926	17	1,059	468	544,903	63.25	5.56	3.63
McKenzie	371	39,320	45	4,586	18	7,087	561	1,055,966	66.13	8.02	3.21
McLean	368	19,039	40	2,673	18	2,212	826	1,093,585	44.55	4.84	2.18
Mercer	275	21,660	22	1,124	17	1,106	387	506,765	71.06	5.68	4.39
Morton	538	48,194	87	9,327	49	4,123	765	1,166,104	70.33	11.37	6.41
Mountrail	310	17,171	21	528	18	2,793	638	963,061	48.59	3.29	2.82
Oliver	193	15,245	39	5,474	15	1,691	276	363,782	69.93	14.13	5.43
Sioux	138	22,786	26	1,014	8	1,054	184	542,232	75.00	14.13	4.35
Slope	185	13,772	30	6,264	37	5,983	255	775,052	72.55	11.76	14.51
Stark	374	23,862	56	5,376	34	3,764	617	756,088	60.62	9.08	5.51
Williams	273	13,804	39	2,241	32	8,832	695	1,091,567	39.28	5.61	4.60
<u>Central North Dakota Counties</u>											
Barnes	224	9,792	70	11,087	27	5,998	764	840,614	29.32	9.16	3.53
Benson	244	18,164	15	2,022	22	4,421	592	773,677	41.22	2.53	3.72
Bottineau	214	9,275	22	1,003	21	1,351	693	937,816	30.88	3.17	3.03
Burke	150	7,067	11	455	13	907	376	548,091	39.89	2.93	3.46
Cavalier	117	3,152	12	1,557	1	167	815	900,823	14.36	1.47	0.12
Dickey	257	19,374	68	18,077	40	4,863	494	604,072	52.02	13.77	8.10

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APPENDIX TABLE J1. CONTINUED

	North Dakota farms with beef cows		North Dakota farms with ewes and lambs		North Dakota farms with hogs and pigs		North Dakota farms with cropland acres		Percent of farms with crop acres which have livestock			
	# Farms	# Beef cows	# Farms	#Ewes&Lambs	# Farms	# Hogs	# Farms	Cropland acres	Beef	Sheep	Hogs	
Eddy	151	11,590	16	1,245	17	2,853	265	337,905	56.98	6.04	6.42	
Foster	127	7,911	11	2,684	24	3,004	307	379,875	41.37	3.58	7.82	
Griggs	155	11,538	15	611	10	539	364	410,200	42.58	4.12	2.75	
Kidder	355	34,592	52	4,531	49	9,185	478	727,193	74.27	10.88	10.25	
LaMoure	246	11,320	40	7,708	54	6,681	611	629,410	40.26	6.55	8.84	
McHenry	441	32,911	35	2,018	32	3,211	722	989,999	61.08	4.85	4.43	
Pierce	208	10,399	21	1,280	10	797	480	559,812	43.33	4.38	2.08	
Ramsey	73	2,203	11	2,073	5	836	520	698,852	14.04	2.12	0.96	
Ransom	207	12,638	77	15,334	22	1,441	390	403,379	53.08	19.74	5.64	
Renville	103	3,417	12	656	3	165	362	482,437	28.45	3.31	0.83	
Rolette	202	11,132	17	1,403	14	1,007	372	460,927	54.30	4.57	3.76	
Sargent	166	9,744	85	18,857	11	974	443	460,719	37.47	19.19	2.48	
Sheridan	196	11,591	25	1,423	1	167	369	484,749	53.12	6.78	0.27	
Stutsman	414	29,213	50	8,821	52	7,165	917	1,254,953	45.15	5.45	5.67	
Towner	98	2,834	18	2,357	14	1,505	481	614,113	20.37	3.74	2.91	
Ward	344	18,825	33	2,904	31	2,981	842	1,113,037	40.86	3.92	3.68	
Wells	206	11,346	38	3,808	19	2,260	573	708,734	35.95	6.63	3.32	
<u>Eastern North Dakota Counties</u>												
Cass	138	7,049	94	22,749	35	6,142	1,030	1,048,802	13.40	9.13	3.40	
Grand Forks	115	5,511	24	7,356	15	1,395	745	786,425	15.44	3.22	2.01	
Nelson	148	5,865	11	2,297	21	1,758	477	574,126	31.03	2.31	4.40	
Pembina	99	7,370	24	14,205	11	714	659	627,166	15.02	3.64	1.67	
Richland	234	12,719	136	21,967	27	1,830	964	845,940	24.27	14.11	2.80	
Steele	61	1,897	12	584	9	552	359	438,862	16.99	3.34	2.51	
Trail	54	4,020	18	4,873	9	377	549	503,702	9.84	3.28	1.64	
<u>Walsh</u>	<u>196</u>	<u>6,787</u>	<u>23</u>	<u>4,783</u>	<u>12</u>	<u>1,304</u>	<u>780</u>	<u>737,296</u>	<u>25.13</u>	<u>2.95</u>	<u>1.54</u>	
North Dakota	12,291	852,442	2,033	287,308	1,190	163,775	28,297	37,878,788	43.44	7.18	4.21	
									West Region average	62.41	9.42	6.28
									Central Region average	41.32	6.47	4.09
									Eastern Region average	18.89	5.25	2.50

Source: Bureau of the Census, 1987.