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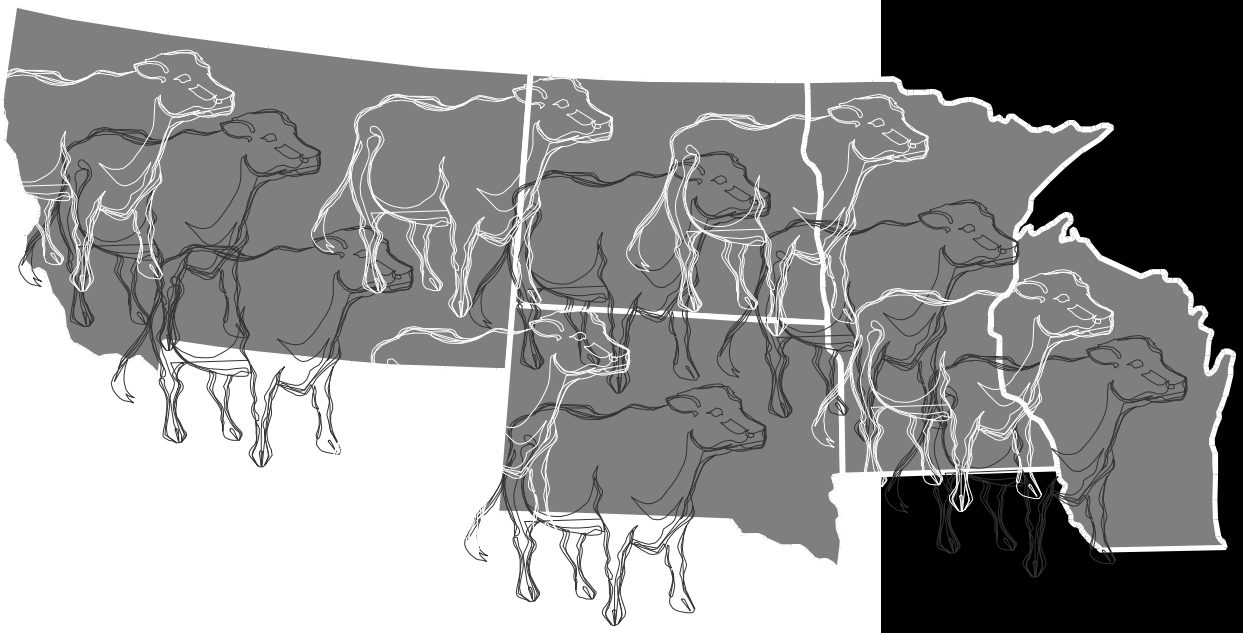
Agricultural Economics Report No. 370

Economic Feasibility of the Cattle Feeding Industry in the Northern Plains and Western Lakes States



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Abstract

The five-state study area of the Northern Plains and Western Lakes States, (Minnesota, Montana, North Dakota, South Dakota, and Wisconsin) has adequate feed supplies and feeder cattle to markedly increase cattle feeding. Feed costs in these states have historically been lower than in the Southern Plains States. However, higher transportation costs appear to offset that advantage. Close access to slaughter plants in these states could offset that transportation disadvantage. Backgrounding of cattle appears to be quite profitable and cattle feeding, especially in larger sized feedlots, can be profitable. However, the cattle feeding industry has an increasing level of excess capacity. To be successful, new feedlots in the Northern Plains and Western Lakes States would need cost efficiencies to offset higher production costs, compared to Nebraska and Kansas, or would need to produce for a niche market unaffected by the lower operating costs of already established feedlots in the Central and Southern Plains States. Finally, a range of strategies are available in developing value-added cattle production in the Northern Plains and Western Lakes States. These strategies embody differing levels of capital investment, risk, and profitability.

Key words: cattle feeding, Northern Plains, economies of scale,cooperative ownership, entrance strategies.

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Highlights

Ample cattle production occurs in the five states to support a dramatically higher level of cattle feeding. Six to seven hundred thousand more fed cattle would not be constrained by the supply of calves and feeder cattle.

Producers of calves would have to markedly change their herd management techniques, shifting to spring and fall calving in order to provide calves and feeder cattle to the feedlots each week of the year.

Ample feed grains and agricultural processing by-products are available to support this increased level of fed cattle production.

By-product utilization would be determined by its price relative to other feedstuffs; it is unlikely by-products could profitably be transported more than about two hundred miles to feedlots.

Although feed grains are less expensive in the Northern Plains than in Nebraska and Kansas, that advantage is more than offset by higher transportation costs due to the distance from Northern Plains feedlots to slaughter plants in the Southern Great Plains.

Potential rates of gain from cattle feeding in the Northern Plains appear competitive with those of Nebraska and the Southern Plains.

Substantial economies of scale exist in cattle feeding. While feed costs do not significantly change, capital costs range from $468 per head for the projected 1,000 head feedlot to $243 for the 20,000 head feedlot. Labor cost range from $52 per head for the 1,000 head feedlot to $23 per head for the 20,000 head feedlot.

Cattle feeding in the Northern Plains is profitable if both feed cost and cattle prices are favorable. If corn price rises above $2.50 per bushel, fed cattle prices need to be above $70 per cwt to cover all production costs.

Backgrounding of cattle appears to be much more profitable than finishing cattle in the five-state area.

Feeding dairy cattle to finished weights is less profitable than feeding beef cattle to finished weights.

Northern Plains cattle feeding is more feasible if finished cattle are transported 150 miles or less to slaughter plants, as compared to three to four hundred miles to slaughter plants in Nebraska.

Strategies for value-added livestock production range from farmer owned feedlots and slaughter plants in the Northern Plains to retained ownership of cattle custom fed in Nebraska feedlots, and custom slaughtered with sale of a branded boxed beef product.

The U.S. cattle industry has been declining in size on a secular basis for several decades. Excess cattle feeding capacity exists in Nebraska and in the Southern Plains, along with sufficient cattle slaughter capacity to handle all cattle fed in the Great Plains.

Sustained profitability for Northern Plains cattle feeders will require achieving cost economies comparable to cattle feedlots in Nebraska and the Southern Plains.

Cattle feeding has not stopped out-migration of young adults from rural communities or prevented loss in population from rural areas. Little additional labor is required for feedlot operation, about one worker for each 1,000 head of cattle on feed.

A variety of vertical networking arrangements may hold substantial promise for farmers in value-added cattle production systems. Successful horizontal networking arrangements were not identified.

The economic benefit to a community from cattle feeding is relatively modest, though not insignificant. Benefits are higher if the feedlot is owned by community residents and as a result, more profits from successful operation are spent within the community, than if profits flow to investors outside the community.

Widespread cattle feeding in the Northern Plains could offer career opportunities for a limited number of veterinarians, nutritionists, and trucking firms.

More stringent siting and permit requirements seem likely to limit the nuisance cost to neighbors and adjacent communities as a result of feedlot development. In many cases, local siting and permit requirements are more stringent than either federal or state requirements.

Cattle feeding does add certain costs to be borne by the community, such as additional maintenance on county roads and limited nuisance aspects related to dust, odor, and insects.

The overall impact on a community as a result of cattle feeding is generally viewed as positive.

Economic Feasibility of the Cattle Feeding Industry in the Northern Plains and Western Lakes States

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I.

Introduction and Study Objectives

Many policy analysts and farm organization leaders are concerned about the impact of substantial reductions in federal farm programs on the U.S. agricultural economy. The changes in federal policy will require new initiatives by farmers to replace lost farm income. Among the initiatives likely to be considered is the development of high value agriculture production to sustain the viability of family farms and rural communities. Livestock feeding could be such a high value alternative in major agricultural states.

Northern Plains and Western Lakes States, mainly Minnesota, Montana, North Dakota, South Dakota, and Wisconsin, have both substantial quantities of feeder cattle and feed grains. Moreover, many farmer-owned processing cooperatives have increased amounts of by-products available to add to feeding rations.

This study considers a range of issues in evaluating the potential feasibility and income enhancement capacity of livestock feeding in the five-state area. These include issues related to cattle and feed availability, feedlot design and cost, optimum feedlot size, cost-effective feed rations, feedlot siting issues, profit opportunities, and community impact. Attention will be given to the impact on local businesses, job formation, income generation, community well-being, and quality of life.

Livestock feeding could be a high value alternative.

This study explored the viability of cattle feeding in Northern Plains and Western Lakes States. The study objectives were to

1. Evaluate the profitability of cattle feeding for family farmers, taking into account the availability of agricultural processing by-products, size considerations, farmers networks, market conditions, and financing and organizational alternatives;
2. Identify and evaluate the impact of legal/regulatory issues on the siting of feedlots, waste management, and odor abatement; and
3. Identify and evaluate the economic and social impacts on communities where livestock feeding occurs.

The study was conducted by researchers in the Department of Agricultural Economics at North Dakota State University in Fargo, North Dakota, with financial support from the Farmers Educational Foundation.

One aspect of the study was interviewing feedlot operators and community leaders in regions with extensive feeding activities. These areas included Garden City, Kansas; the Platte River area of central Nebraska; southern Iowa; southwestern Minnesota; and southeastern South Dakota. The survey findings are discussed in relevant sections of the report. Others findings are summarized in Appendix B.

II.

Characteristics of the U.S. Cattle Industry

The reason for examining the characteristics of the U.S. cattle industry is to better understand its status and the trends affecting the industry. Such a understanding will enable farmers and ranchers in the five states that are the focus of the study to better determine opportunities that might exist for them in the industry.

Feeder Calf Production

The cattle industry is an important segment of U.S. agriculture. Sales from cattle and calves accounted for $46.7 billion (USDA) in the United States in 1995. Sales from the five-state area totaled $3.8 billion in 1994 (USDA).

Most states produce a substantial number of calves, but the main concentration is in the Great Plains and the Mississippi and Ohio River Valleys. Table 1 summarizes the distribution of calf production across these regions. From 1974 to 1994, the number of calves produced has fallen in most states. The number of calves born in the United States was 54.3 million in 1974 and 44.6 million in 1994, a decrease of 18% (USDA).

Each state in the five-state study area has lost production in the past 20 years. In 1974, South Dakota and Wisconsin each produced over 2 million calves annually. The number decreased substantially by 1994; South Dakota produced 1.78 million calves, a 20% decrease, and Wisconsin produced 1.69 million calves, a 22.5% decrease. Minnesota reduced calf production 37% from 1.6 million to 1 million head, North Dakota reduced production 23% from 1.3 million to 1 million head, and Montana reduced production 48% from 3.04 million to 1.58 million head. The five states produced 10.36 million calves in 1974 and 7.08 million calves in 1994, a reduction of 32%.

There is ample opportunity to acquire a large number of calves for either backgrounding or feeding to finish within the five states. However, cattle producers will need to adjust calving schedules to assure the availability of both calves and feeder cattle on a year-round basis and to supply the ongoing needs for an expanding feeding industry in the five states. Moreover, these calves and feeder cattle must be available to cattle feeders at competitive prices.

Cattle Feeding

Table 1 also shows the distribution of cattle feeding in central United States from 1974 and 1994, respectively. In 1974, cattle feeding was concentrated in Iowa, Nebraska, Kansas, Texas, and California. However by 1994, Nebraska, Kansas, and Texas fed most of the U.S. cattle. The number of cattle on feed on January 1 in the United States was 13.6 million head in 1974 and declined to 12.8 million head in 1994. The number of cattle fell, but with the increase in live weight, the production of carcass weight increased slightly.

North Dakota and Wisconsin have increased cattle on feed during the past 20 years, while Montana, Minnesota, and South Dakota have decreased production (table 1). The five-state total number of cattle on feed has decreased 17% over the past 20 years from 1.15 million head in 1974 to .96 million head in 1994.

The decline in cattle feeding in the five states reflects a number of factors. First, it reflects the

Table 1. Number of Calves, Cattle on Feed, and Cattle Slaughter in Selected States for 1974 and 1994

State	Calves		Cattle on Feed		Slaughter	
	1974	1994	1974	1994	1974	1994
	- - - - - - - - - - - - 1,000 Head - - - - - - - - - - -					
Leading						
Texas	6,820	6,400	2,205	2,460	4,083	6,198
Nebraska	2,409	1,960	1,525	2,130	4,754	6,525
Kansas	2,200	1,590	1,160	2,010	2,617	6,885
Colorado	1,201	900	930	1,000	2,298	2,420
Study Area						
Montana	3,040	1,580	122	75	185	22
Wisconsin	2,180	1,690	136	140	1,286	1,351
North Dakota	1,305	1,010	49	70	217	***
South Dakota	2,225	1,780	381	340	713	247
Minnesota	1,608	1,020	464	330	1,313	1,044
Total	10,358	7,080	1,152	955	3,714	2,664
Other						
Iowa	2,180	1,310	1,715	890	4,447	1,734
Oklahoma	2,505	2,050	292	345	696	46
Missouri	1,775	2,300	250	105	909	155
Arkansas	1,190	1,030	19	17	211	28
Wyoming	816	740	39	90	23	6
Illinois	1,110	670	530	330	1,316	***
US Total	54,293	44,643	13,642	12,789	36,812	34,197

***Data unavailable

relative price strength in cash grain markets over the early and latter parts of this period. Second, it reflects the growing lack of nearby slaughter plants to support cattle feeding in the five states. Finally, it also reflects the growth in cattle feeding in Nebraska, Kansas, and other Southern Plains and Rocky Mountain states.

Cattle Slaughtering

Nebraska, Iowa, and Texas led in federally inspected slaughtering with 4.8 million, 4.4 million, and 4.0 million head slaughtered, respectively, in 1974. California slaughtered 2.9 million head followed by Kansas with 2.6 million head. In 1994, Kansas led the nation with 6.9 million head, followed by Nebraska, 6.5 million; Texas, 6.2 million; and Colorado, 2.4 million head slaughtered. Most other states have reduced slaughtering, while Kansas, Nebraska, and Texas have increased production substantially during the past 20 years.

The five-state area has reduced slaughter numbers, from 3.7 million head in 1974 to 2.7 million head in 1994, a reduction of 28%.

The sharp decline in cattle slaughter in the five states reflects the combined forces in Nebraska, Kansas, and other Southern Plains and Rocky Mountain states of growth in irrigated corn production, large-size feedlot development, and the consolidation/relocation of modern livestock slaughter plants.

The Cattle Cycle

Figure 1 shows the number of beef cows on farms for January 1, from 1974 to 1996, in both the United States and North Dakota (USDA). Beef cow numbers for the nation and the five states follow similar trends. Beef cow numbers peaked in 1975, 1982, and possibly in 1996, when the prices of calves were at or near their lowest point. Cattle numbers for January 1, 1996, indicate an increase for the last half of 1995, but at a slower rate than a year earlier. That increase indicates the liquidation of cattle numbers had not started. The Food and Agriculture Policy Research Institute (FAPRI) estimates that prices will bottom out for the current cattle cycle in 1997, when calf prices will decline to near $61 to $62 per cwt (Table 2).

Figure 2 shows the historical prices for Oklahoma feeder steers (FAPRI) and North Dakota calf prices (NASS). The prices for both bottomed out in 1975 between $30 and $35 per cwt. The price then increased until 1979 to over $80 per cwt. Oklahoma feeder steer prices fell to below $70 per cwt in 1986 and increased to over $90 per cwt in 1991-92. Prices have fallen to $70 per cwt since 1992. Oklahoma feeder steer prices tend to set price trends for feeder steers elsewhere in the nation. Historically, cattle prices have followed about a ten-year cycle.

On balance, Northern Plains cattle prices, including calf and feeder cattle prices, can be expected to follow both national market patterns and price movements associated with the cattle cycle. Since the industry is in the liquidation phase of the cycle, low prices can be expected for another year or two. By 1998, the liquidation phase should be completed. The stage will be set for stronger prices for all levels of the cattle industry as more heifers are held back for herd replacements.

U.S. Meat Consumption

Total U.S. meat consumption has increased from 227 lbs/capita (carcass weight equivalent) in 1978 to 266 lbs/capita in 1995. However, the proportions of different meats have changed over the past 17 years. Beef consumption has decreased 19.4% from 118 lbs/capita in 1978 to 95 lbs/capita in 1995. Pork consumption has increased 18.5% from 60 lbs/capita in 1978 to 71 lbs/capita in 1995. Poultry consumption has increased 101.5% from 49 lbs/capita in 1978 to 99 lbs/capita in 1995.

U.S. meat exports have substantially increased over the past 2 decades. Beef exports have increased 655% from 0.11 million tons in 1978 to 0.83 million tons in 1995. The beef export market amounts to 6.6% of total U.S. beef demand. Beef

Table 2. Calf Prices Projected by FAPRI and North Dakota Estimated Calf Prices

Year	FAPRI Calf	ND Calf	ND Background
	- - - - - - - - - -	$/cwt	- - - - - - - - - -
1995	70.44	73.58	62.51
1996	60.90	66.31	52.95
1997	62.30	67.38	54.36
1998	71.25	74.20	63.32
1999	78.41	79.65	70.49
2000	87.51	86.59	79.60
2001	91.14	89.36	83.24
2002	96.60	93.52	88.71
2003	92.33	90.26	84.43

Source: FAPRI, NASS.

imports have remained relatively constant in the 0.9 to 1.2 million tons range annually.

The cattle industry has been experiencing an ongoing secular decline in domestic consumption of beef over the past two decades. Pork and especially poultry have captured an increasing share of the growing U.S. meat consumption. This is likely the result of higher cost of beef, greater variety in pork and poultry products, and health concerns about red meat by some consumers.

Further reductions in the U.S. cow herd would suggest even greater excess capacity in the nation's feedlots. New entrants into cattle feeding will need to be lower cost producers of fed cattle or will have to tap into a market niche in which the attributes of their product or transportation and distribution advantages insulate them from direct price competition with older established feedlots.

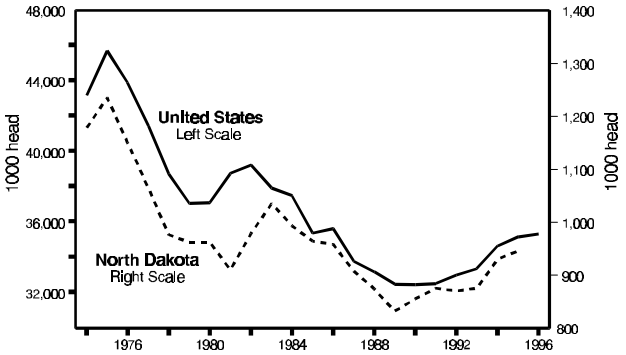

Figure 1. Number of Beef Cows on Farms for United States and North Dakota, January 1.
Source: Livestock Situation and Outlook, USDA. North Dakota Agricultural Statistics, NASS.

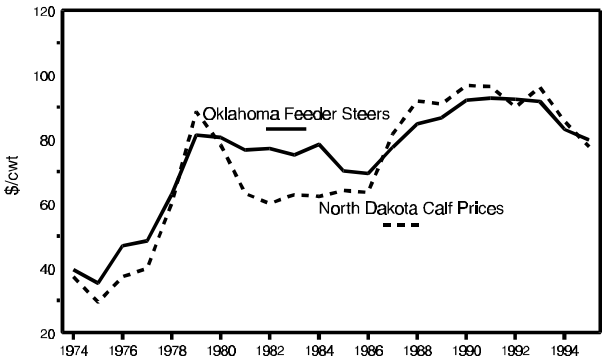

Figure 2. Prices of Oklahoma Feeder Steers and North Dakota Calf Prices.
Source: Livestock Situation and Outlook, USDA. North Dakota Agricultural Statistics, NASS.

III.

Feedlot Design and Construction Cost

This section summarizes design requirements and the cost of construction for three sizes of feedlots; 1,000 head, 5,000 head, and 20,000 head. Smaller-sized feedlots were not designed because the higher cost per head is sufficient to deny profitability under likely feed grain and cattle price scenarios (Appendix A). The feedlots evaluated here are priced as turn-key operations ready for use.

Design

Space requirements, lot, and handling facilities were designed utilizing plans from *Midwest Plan Service's Beef Housing and Equipment Handbook* and *Economics of Establishing a Beef Cattle Feedlot Using By-products of Ethanol Production in North Dakota* by Stearns et al. The feedlots are designed with pen sizes in multiples of 60 head per pen to facilitate semi-truck shipments. Pens are laid out in rows with feed alleys between every other row of pens. The hospital area, loading and unloading, and feed processing areas are located near the center of the lot to minimize transportation within the lot.

Table 3 shows the number of pens, pen sizes, corral fence requirements, and feed bunk requirements for the three different lot sizes used in the study. The requirements for these items are based mainly on the number of cattle within the lot; therefore, there is little difference among the cost per head for the various sized lots.

Feedlot Construction Costs

Table 4 shows the feedlot equipment required for the various sized lots. The number of waterers, lights, gates, and water wells are based on the size of the lots. A one-day water storage requirement is designed into the system.

Feedlots of 1,000 head or more are required by federal law to establish a lagoon system to retain runoff from the feedlot. The dirt removed may be used for pen mounds. It is common practice to create dirt mounds in the cattle pens so cattle are assured

of a dry place to rest and are able to get high enough to obtain summer breezes during hot weather.

Iowa, southern Minnesota, and southeastern South Dakota cattle feeders often erect open-sided pole barns to protect the livestock from cold rain and adverse weather. Research at the Carrington Research Center indicates that board fence wind-breaks should suffice in Montana, North Dakota, and the drier areas of South Dakota.

Grain and Feed Handling Facilities

The grain handling, buildings, and feed handling requirements for the three sizes of feedlots are shown in Table 5. Grain storage is designed for a 21-day supply.

Table 3. Fencing and Feed Bunk Requirements for Various Feedlots

Item	Number of Pens	Total Head	Fencing Per Head	Total Fence	Total Bunk
			- - - - - - - - feet	- - - - - - - -	
1,000 Head Feedlot					
Feeding area					
Pen Size (head)					
60	2	120	9.2	1,104	111
120	3	360	5.5	1,980	331
180	3	540	4.3	2,322	496
Hospital Area				200	100
Loading/unloading and processing area				200	100
Total				5,806	1,137
5,000 Head Feedlot					
Feeding area					
Pen Size (head)					
60	4	240	9.2	2,208	250
120	12	1,440	5.5	7,920	1,200
180	12	2,160	4.3	9,288	1,800
240	5	1,200	3.7	4,440	1,000
Hospital Area				750	120
Loading/unloading and processing area				600	180
Total				25,206	4,550
20,000 Head Feedlot					
Feeding area					
Pen Size (head)					
60	4	40	9.2	7,728	772
120	48	5,760	5.5	31,680	5,300
180	48	8,640	433	7,152	7,950
240	20	4,800	3.7	17,760	4,416
Hospital Area				3,000	480
Loading/unloading and processing area				2,400	600
Total				9,720	19,518

Source: V.L. Anderson, animal scientist, Carrington, ND. Research Extension Center.

Table 5 also shows the buildings required for a 1,000, 5,000, and 20,000 head lot. A general purpose office, maintenance, cattle processing and feed handling building would be needed for a 1,000 head lot. Two buildings are needed for a 5,000 head lot -- 1) a combination office and maintenance building, and 2) a feed handling, cattle processing, and hospital area. A 20,000 head lot would need

Table 4. Lot Equipment and Land Improvements for 1,000, 5,000, and 20,000 Head Feedlots

Item	Quantity	Dollars
1,000 Head Feedlot		
Waters(number)	4	2,240
Lights(number)	10	8,400
Gates(number)	23	2,806
Scale(number)	12	5,000
Wells (number)	1	8,000
Windbreak (lin. ft.)	500	3,915
Corral (lin. ft.)	5,806	30,946
Working (lin. ft.)	800	4,800
Plank (lin. ft.)	441	2,351
Feed bunks (lin. ft.)	1,137	18,601
Lagoon (cubic yards)	1,000	12,422
Ditching (cubic yards)	1,000	1,520
Cement		29,110
Land (acres)	12	6,000
Total		**156,111**
5,000 Head Feedlot		
Waters (number)	17	9,520
Lights (number)	25	21,000
Gates (number)	115	14,030
Scale (number)	1	84,090
Wells (number)	1	8,000
Windbreak (lin. ft.)	2,040	15,973
Corral (lin. ft.)	25,206	134,348
Working (lin. ft.)	3,000	18,000
Plank (lin. ft.)	2,205	11,753
Bunks (lin. ft.)	4,550	74,438
Lagoon (cubic yards)	50,000	62,107
Ditching (cubic yards)	5,000	7,600
Cement		145,550
Land (acres)	60	30,000
Total		**636,409**
20,000 Head Feedlot		
Waters (number)	68	38,080
Lights (number)	50	42,000
Gates (number)	460	56,120
Scale (number)	1	84,090
Wells (number)	3	24,000
Windbreak (lin. ft.)	8,160	63,893
Corral (lin. ft.)	99,720	531,508
Working (lin. ft.)	7,600	45,600
Plank (lin. ft.)	7,000	37,310
Bunks (lin. ft.)	19,518	319,314
Lagoon (cubic yards)	150,000	248,430
Ditching (cubic yards)	20,000	30,400
Cement		582,200
Land (acres)	240	120,000
Total		**2,222,945**

four buildings 1) office, 2) feed handling, 3) cattle processing, and 4) hospital. Smaller lots use a mixer/grinder to prepare the ration, whereas the 20,000 head lot uses a stationary feed mill.

Machinery and Equipment Requirements

Machinery and equipment costs are projected based on the common practices for equipping feedlots of the selected sizes. Table 6 shows the machinery and equipment requirements and cost for the various feedlots.

Table 7 summarizes the capital costs for the development of the various sizes of feedlots in the study. The table illustrates a declining per head cost as feedlot size increases. The per head of capacity cost difference between the 1,000 head and 5,000 head lot is $188.90. The difference between the 5,000 head and 20,000 head lot is $35.92.

Farmers planning to feed their own calves and feeder cattle on their own farms will question some of the feedlot construction and equipment costs. It is important to remember the outlined costs are for new construction and equipment, with the completed feedlot ready to use. Farmers who choose to use existing facilities for feeding and utilize existing equipment will clearly reduce the initial capital cost.

Two cautions are important, however. Achieving the high rates of gain used in this study's profitability calculations requires high quality facilities and outstanding management. If efforts to reduce the capital investment required to enter the feeding business result in reduced feedlot performance, it is unlikely the operation will achieve the profitability targets used in this report. Likewise, profitable cattle feeding requires outstanding management of all aspects of the feedlot operation. If reduced capital investment and small-size operation compromise the performance of the feedlot, the profit targets used in this report will not be achieved. However, it is also

Table 5. Grain Handling Equipment and Buildings for 1,000, 5,000, and 20,000 Head Feedlots

Item	Size	Number	Dollars
1,000 Head Feedlot			
Buildings			
Office	40X50X14	1	23,000
Grain Handling			
Bin	8000 bu	1	9,920
Leg	2000 bu/hr	1	8,000
Overhead bin	1700 bu	1	6,800
Misc. equipment			7,000
Total			**54,720**
5,000 Head Feedlot			
Buildings			
Office	60X50X16	1	51,330
Processing	48X48X12	1	25,267
Grain Handling			
Bins	20000 bu	2	49,600
Leg	3000 bu/hr	1	10,000
Overhead bins	1700 bu	2	13,600
Misc. equipment			25,000
Total			**174,797**
20,000 Head Feedlot			
Buildings			
Office	104X60X16	1	102,660
Feed	70X30X16	1	33,000
Processing	48X40X12	1	25,267
Hospital	48X40X12	1	25,267
Grain Handling			
Bins	30000 bu	6	223,200
Leg	3000 bu/hr	1	10,000
Overhead bins	3500 bu	2	28,000
Misc. equipment			37,000
Feed Processing Mill	2000 bu/hr	1	33,200
Total			**517,594**

Table 6. Equipment Requirements and Cost for Various Size Feedlots

	1,000 Head		5,000 Head		20,000 Head	
	No.	$	No.	$	No.	$
Tub grinder	1	59,360	1	59,360	2	118,720
Feed truck	1	51,000	2	142,000	6	568,000
Payloader					2	205,184
Loader tractor	1	52,000	1	68,000	3	204,960
Tractor	1	20,000	1	33,600	3	100,800
Snow blower	1	3,360	1	3,360	2	6,720
Scraper	1	2,700	1	2,700	2	5,400
Mower	1	3,200	1	3,200	2	6,400
2wd pickup			1	14,560	2	29,120
4wd pickup	1	10,000	1	17,920	2	35,840
Tandem truck	1	40,000	1	72,800	3	218,400
Dump truck			2	145,600	8	582,400
Trailer	1	6,720	1	6,720	2	13,440
Post hole	1	2,130	1	2,130	1	2,130
Hyd chute			1	6,500	1	6,500
Squeeze chute	1	1,500	1	1,500	2	3,000
Horse and tack			1	3,000	4	12,000
Total		**51,970**		**583,270**		**2,119,014**

Table 7. Capital Cost Summary for Various Feedlots

Feedlot Size	Lot Equipment & Land Improvement	Buildings	Machinery	Total	Per Head Cost
head	dollars				
1,000	156,111	54,720	251,970	462,801	467.80
5,000	636,409	174,797	583,270	1,394,476	278.90
20,000	2,222,945	517,594	2,119,014	4,859,553	242.98

conceivable that farmers feeding cattle in relatively small farm feedlots could achieve acceptable rates of gain during the feeding period.

An additional and critically important issue for farmers planning to feed calves or feeder cattle is the adequacy of feed supply. Cattle feeding is more likely to be profitable in a location where feedstuffs are in excess supply. In those circumstances, cattle feeders are able to buy feed grains delivered to their feedlots at little or no premium over the price offered by local grain elevators. The experience of cattle feeders is that it is always more profitable to take the feeder cattle to the feed supplies rather than to move feed supplies to the source of the cattle. Cattle feeding in Kansas, Minnesota, Nebraska, and South Dakota occurs principally in areas of dependable and surplus feedstuff supplies.

Interregional Competitive Issues

Deciding to construct a new feedlot is more complex than the design and construction cost analysis would suggest. It is also necessary to evaluate the cattle feeding capacity in the cattle industry, relative to the number of cattle to be fed. Beef cattle numbers in the United States continue to be in a long-term decline. Hence, to successfully add new capacity in the cattle feeding industry, it is necessary to displace some of the feedlot capacity in place in other regions of the country. To do so, production from new feedlots must be more cost effective than from feedlots in place, or it must serve a niche market that is not affected by the established feedlot capacity with its potentially lower costs.

Our interviews with feedlot operators in other states, especially Kansas and Nebraska, revealed that many feedlot operators in these two states were planning expansions in cattle feeding capacity. At the same time farm-size feedlots typically stood empty, having been abandoned as unprofitable. The evidence of abandonment of these farm-size feedlots was particularly common in southern Iowa. Cattle feeders in Kansas and Nebraska indicated they could add feedlot capacity for about $160 per head. Some feeders indicated new fixed investment might have to be constrained to no more than $125 per head to be competitive. Moreover, most feedlots in these two states have been in use for several years to a few decades, and their initial fixed investment is at least partially amortized. Thus, the fixed cost of feeding cattle in those feedlots will be significantly less than in a newly constructed feedlot in the Northern Plains in which the total investment is projected to exceed $240 per head.

IV.

Availability of Feed Stuffs

Feedstuff availability is a primary consideration in determining whether a region will be competitive in cattle feeding. Cattle feeders interviewed in Garden City, Kansas; the Platte River Valley of Nebraska; southern Iowa; western Minnesota; and eastern South Dakota all emphasized the importance of readily available feed grains supplies produced reasonably close to the feedlot. Cattle feeders in Kansas and Nebraska noted that large-size cattle feeding did not develop until irrigated corn production brought an assured and abundant supply of corn to the cattle feeding areas. This section discusses the production and, hence, the availability, of feedstuffs nationally and in the five-state study area.

Figure 3 shows the feed grain production for the five-state area for 1975, 1985, and 1995. The five-state area has increased production 72% from 880.4 million bushels in 1975 to 1,520.6 million bushels in 1995.

Based on the data presented, it is reasonable to assume a ready supply of locally available feed grains, principally corn, in Minnesota, eastern South Dakota, and Wisconsin and barley in northeastern Montana and western North Dakota, to support an increased level of cattle feeding. Typically, cattle feeders prefer to purchase locally produced feed grains delivered to the feedlot and weighed over the feedlot scale. For this access to feed grains, cattle feeders expect to pay regionally competitive prices. This access to competitive feedstuffs typically

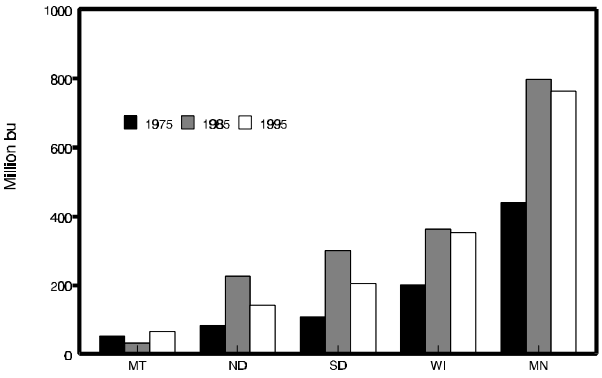

Figure 3. Five-State Feed Grain Production.
Source: Agricultural Statistics. USDA.

requires that feedlots be located in areas of surplus feed grain production.

Some difference of opinion exists as to whether cattle finished on barley will sell as favorably as cattle finished on a corn ration. The issue is whether the white fat covering and marbling associated with barley-fed cattle is as attractive to the consumer as the yellow fat covering and marbling associated with corn-fed cattle. Cattle feeders interviewed indicated a preference for corn in finishing cattle although barley-fed cattle gain about as well, and there does not appear to be any adverse taste associated with barley-fed cattle. Cattle feeders interviewed in Kansas, Nebraska, and Iowa believed slaughter plants with which they did business would prefer the yellow marbling, resulting from feeding corn. Researchers at the Carrington Research Center suggested this issue is more individual preference for yellow marbling than one of better feedlot performance. Moreover, barley is a primary feedstuff in the Pacific Northwest and Western Canada with no apparent price penalty for the cattle fed on a barley ration.

Table 8 shows the historical price difference between corn in the southern states and North Dakota. Corn is traditionally priced higher in the Southern Plains. Over the past ten years, corn has been $0.24 per bushel higher in Kansas and $0.17 per bushel higher in Nebraska than in North Dakota. This is true because grain prices are typically lower priced as one moves away from the center of utilization to reflect transportation and handling costs associated with moving the grain to the center of utilization. The lower cost of feed grains in the Northern Plains could be an important advantage for cattle feeding in the region. If slaughter plants were located sufficiently close to the supply of fed cattle, the price advantage for feed grains enjoyed by the Northern Plains region would not be offset by higher transportation costs of fed cattle to slaughter plants.

When fed cattle are transported greater distances from feedlots to slaughter plants, shrinkage in cattle weight increases. Moreover, some of that loss is in tissue weight rather than just loss of liquid from the animals' guts. Some might suggest that the animals be kept at the slaughter plant site for sufficient time to replace lost weight through feeding and access to water. This idea is impractical, adds to cost, and is unlikely to be implemented. Typically, cattle are trucked from feedlots directly to slaughter plants and are slaughtered within hours of their arrival at the plants. Limiting the distance fed cattle are transported to the slaughter plants appears to be the standard practice used to limit the shrinkage experienced by the cattle.

One question to consider is whether expanded livestock feeding in the five states would strengthen the local feed grain market and, as a result, diminish the grain price advantage that exists. Only a qualitative answer is possible to that question. Given the general level of feed grain production in four of the five states, the exception is Montana, it is unlikely that moderate increases in cattle feeding would have much effect on feed grain prices, except in local markets where consumption of feed grains accounted for a large proportion of total feed grain usage. For example, if feedlot consumption was sufficiently high to require feed grain to be imported into that local market, the price advantage typically enjoyed by Northern Plains producers would likely be lost. As a result, feedlots would likely be located

Table 8. Price Differential for Corn Among Kansas, Nebraska, and North Dakota, Price Received by Farmers

	Location			Difference Between	
	Kansas	Nebraska	North Dakota	North Dakota and Kansas	North Dakota and Nebraska
	- - - - - - - - - - - dollars/bushels - - - - - - - - - -				
1986	1.60	1.52	1.42	0.18	0.10
1987	1.80	1.70	1.65	0.15	0.05
1988	2.60	2.48	2.40	0.20	0.08
1989	2.28	2.30	2.24	0.04	0.06
1990	2.30	2.30	2.15	0.15	0.15
1991	2.45	2.40	2.25	0.20	0.15
1992	2.15	2.09	1.85	0.30	0.24
1993	2.61	2.52	2.27	0.34	0.25
1994	2.32	2.33	2.06	0.26	0.27
1995	3.25	3.15	2.80	0.45	0.35
Ten Year Average	**2.57**	**2.50**	**2.33**	**0.24**	**0.17**

Source: USDA.

Lower cost of feed grains could be an important advantage.

in those regions in the Northern Plains where a surplus of feed grains would exist even after the feedlot was in operation. This means locating feedlots where feed grain is in surplus, rather than where the cattle are raised.

In the absence of cattle slaughter capacity within 200 miles of cattle feedlots, the price advantage for feed grains in the Northern Plains States is more than offset by the cost of transporting Northern Plains finished livestock to slaughter plants.

With a corn-barley ration, a steer or heifer consumes about 21 bushels of corn and 13 bushels of barley during the feeding cycle. The feed grain cost advantage for feeding cattle in North Dakota, compared to feeding in Kansas, is between $3.57 and $5.04 per head of finished livestock.

Cattle feeders interviewed during this study all indicated a willingness to utilize agricultural processing by-products in their feeding rations to lower their feeding costs. By-products must be competitively priced with available feed grains before they will be fed. This causes some confusion. Availability of agricultural by-products does not necessarily create a more favorable environment for cattle feeding. By-products all move in domestic and export markets and are priced based on the source grain and the feed value remaining after processing that grain.

This means that by-products are not available at distress prices for use by local cattle feeders. Cattle feeders will be expected to pay for the remaining feed value in the by-product, as compared to the price of the predominant feed grain. Corn is the feed grain against which the remaining feed value is measured and against which the by-products are priced. Wet by-products would be priced substantially below the same by-products after drying, because of the difference in feed value.

Supplies of feed grains are adequate to support a marked increase in cattle feeding.

Cattle feeders indicated it was difficult to haul by-products from a distant location and still have them competitively priced. A 200-mile distance was mentioned by Nebraska feedlot operators as nearing the maximum transportation distance. Cattle feeders indicated they fed by-products only when they were able to secure a reliable source of the product for the entire feeding period in which they were used. Cattle feeders were reluctant to change feedstuffs in the ration once cattle are on feed.

The ProGold Corn Processing plant located in southeastern North Dakota will be operational during the winter of 1996-97. The plant will be processing more than 25 million bushels of corn annually into corn syrup, starch, corn gluten feed, corn gluten meal, and corn germ. The plant will be producing about 280,000 tons of corn gluten feed (CGF) annually, a satisfactory feed supplement for cattle on feed. CGF has 92% of the energy of corn and 2.3 times the protein (Owens).

Operations of the Dakota Growers Pasta Plant in Carrington add approximately 66 thousand tons of by-products to the available supply in North Dakota (Northern Crops Institute). The location of new large-size potato processing facilities in central North Dakota could add to the amount of potato processing by-products in North Dakota and western Minnesota.

By-products available from sugar beet processing plants in western Minnesota and eastern North Dakota totaled 6 million tons in 1995 (Midwest Agri). Other by-products suitable for use in cattle feeding are available from ethanol and other agricultural commodity and food processing facilities in Minnesota, South Dakota, and Wisconsin. Any processing plant by-products that can be utilized for energy by rumen bacteria are potentially useful in cattle feeding.

Adequate supplies of feed grains, principally corn and barley, along with growing amounts of agricultural processing by-products exist in much of the five-state area to support a marked increase in cattle feeding. Cattle producers could reasonably think in terms of an increase of at least 600,000 to 700,000 head of cattle fed in the five states of the study area, based on the availability of feedstuffs.

V.

Feedlot Siting Regulations

Feedlot siting requires compliance with a web of interlocking requirements at the federal, state, and, increasingly, local government levels. While the federal Environmental Protection Act sets the overall dimensions for the requirements, most state regulations are often more stringent. There is a growing trend for local governments to impose even more stringent pollution management controls on feedlot siting. Table 9 of this report outlines state feedlot siting requirements for the five states that are the focus of this study.

A key component of these siting requirements is the control of runoff from feedlots. The 1972 Clean Water Act prohibits the discharge of pollutants into water of the United States without a National Pollutant Discharge Permit. The Act regulates cattle feedlots with a one-time capacity of 1,000 head or more. All runoff from the feedlot, manure storage areas, feed processing, and feed alleys must be retained in a lagoon. The Act states that the lagoon must be constructed at least 3 ft. above bedrock and at least 2 ft. above the water table. Most states require a clay liner that permits less than 1/16 inch seepage per day and groundwater monitor stations.

The dirt removed from the lagoon can be used to create mounds in the feeding pens to assure dry areas for the cattle to rest in the feedlot. In addition to the lagoon, the feedlot and manure storage areas must be protected from surface running water during a storm event. In Minnesota, for example, the lagoon, feedlot, and manure storage area must be protected against a 100-year flood (Copeland).

Local government entities in some locations also have developed their own pollution control standards. For example, in Minnesota, the Blue Earth County Livestock Waste Management Ordinance requires specified setbacks from public and private ditches, surface tile inlets, water wells, sinkholes, residential dwellings, and public roads for the land application of manure. Where the manure is spread without incorporation, separation distance from surface waters is governed by whether soil is frozen, soil texture, and soil slope. The lagoon contents are spread on growing crops using sprinkler or gated pipe irrigation systems.

To obtain siting permits, access contracts must be in place for land to spread the expected manure from the feedlot. One acre of land is required for every two slaughter steers or heifers of feedlot capacity (two animal units per acre). The participating county or the Minnesota Pollution Control Agency may set additional requirements regulating waste storage and management.

The EPA does not consider airborne particles that are discharged from a feedlot to be pollution. State and local governments control odors with siting regulations that determine the location of the facility with reference to adjacent human population. However, courts have ruled that odor does create a nuisance in a number of cases where nuisance odors suits have been filed (George).

There is no legally defined distance within which odors of a nuisance level are not permitted, but a feedlot should be located at least 1.2 miles from neighboring residences and housing developments. Future court decisions may define this issue. Future population development should be projected before siting to minimize problems resulting from growth of housing developments near an established feedlot.

In states with ‘right to farm’ laws, farms operating in areas zoned for farming cannot be charged with nuisance violations from farm operations, such as odor problems. However, in some states, courts have decided that large commercial feedlots do not qualify for protection under those statutes. Courts do not consider them to be farms.

Several methods are available to minimize dust and odor releases from a feedlot. Dust control can be established with proper housekeeping in the feedlot. Routine cleaning of pens and feed processing areas, proper storage of dry manure, and well-designed windbreaks surrounding the feedlot are helpful steps. Odors can be controlled with proper management at each step in the manure-handling system. Excessive odors are generally the result of a breakdown in one of the pollution management systems (Ritter) rather than a result of day-to-day operations. Many of the feedlot operators surveyed as part of this study make similar observations.

Odors can be controlled with proper managment.

State governments have increasingly allowed local governments, counties, townships, towns, zoning boards, and other government units to establish their own regulations for siting feedlot and other confined livestock production systems. These local boards enact more stringent siting requirements than do state governments. The requirements often differ substantially from jurisdiction to jurisdiction within a given state where local decision authority exists. Not infrequently, local boards take the 'not in my back yard' approach to feedlot siting and expansion.

In most states, it is easier to obtain permits to expand an existing feedlot than to site a new facility. Cattle feeders interviewed for this study report that state and local siting requirements are becoming increasingly stringent with regard to water pollution, runoff control, odor problems, and distance from the nearest human population. A number of states have begun to inspect and re-license feedlots annually.

Community leaders interviewed believe feedlot development should occur, but only if its placement and attention to environmental issues are appropriately controlled by the government to protect other community residents against water, dust, odor pollution, and flies. Except for instances in which older feedlots expanded and encroached on adjacent towns or residences, or towns and residences encroached upon feedlots, the relations between communities and the feedlots were generally harmonious.

In Kansas, both feedlot operators and community residents were strongly opposed to the introduction

Table 9. Siting Requirements for Livestock Feedlots

	Minnesota	Montana	North Dakota	South Dakota	Wisconsin
Regulating Authority	Minnesota Pollution Control Agency Water Quality Division 520 Lafayette Road N. St. Paul, MN 55115-4194	Montana Department of Health and Environmental Sciences Water Quality Division Cogswell Building Capital Station Helena, MT 59620-0901	North Dakota Department of Health, Environmental Health Section 1200 Missouri Ave. Box 5520 Bismarck, ND 58502	Environmental Protection Agency U.S. EPA - Region 8 999 18th St. Denver, CO 80202	Wisconsin Department of Natural Resources 101 South Webster St. Box 7921 Madision, WI 53707
Size Required for Permit	Greater than 1,000 Animal Units	Longer than 45 days confinement	Greater than 200 Animal Units	Greater than 1,000 Animal Units	Greater than 1,000 Animal Units
Type of Permit	National Pollutant Discharge Elimination System	Montana Pollutant Discharge Elimination System	North Dakota State Health Department Permit	National Pollutant Discharge Elimination System	Wisconsin Pollutant Discharge Elimination System
Lagoon Storage Capacity	25 year - 24 hour storm event	25 year - 24 hour storm event	25 year - 24 hour storm event	25 year - 24 hour storm event	25 year - 24 hour storm event
Lagoon Seepage Limit	1/16 inch/day	1/4 inch/day	1/8 inch/day	1/4 inch/day	1/16 inch/day
Siting Authority	Local Control 1,000 ft. from residence, 1/2 mile from cities	Local Control	Local Control	Local Control	Local Control
Waste Management	Crop Capacity	Crop Capacity	Crop Capacity 200 ft. from wells	1,000 ft. from public wells 150 ft. from private wells	Contracted Areas
State Agricultural Nuisance Law	1983 Right to Farm Restrictions Family farm Six year prior operation	1981 Right to Farm Restrictions Normal operation Prior operation	1981 Right to Farm Restrictions One year prior Normal operation	1987 Right to Farm Restrictions Prior operation Reasonable expansion	1982 Right to Farm Agriculture is exempt unless it is a threat to health

of large-size confinement hog production because of the perceived odor and pollution problems. Iowa, Nebraska, and South Dakota seemed to take a more benign approach to both hog production and cattle feedlots.

Water Permits

All users of substantial amounts of well water are required, in most states, to obtain water permits from the state. In North Dakota, any user of more than 12.5 acre-feet per year is required to obtain a permit from the state engineer (North Dakota State Water Commission). Any feedlot with over 600 head of cattle on feed will utilize that amount of water. The water use permit requires information on the source of the water, where it will be used, what it will be used for, the withdrawal rate, the period of use, and other conditions required by the state engineer. The state engineer requires that all landowners within one mile of the site be notified when a required public hearing is scheduled.

It is unlikely, however, that shortfall of water will seriously constrain feedlot development in the five-state study area. Ample water appears available to support this development across most of the five-state area.

Soil Grade, Type, and Permeability

Soil grade, type, and permeability are major factors in determining the appropriate siting of a feedlot. A natural grade which allows for surface drainage is needed to remove unwanted surface water from the feedlot. A natural grade of 2% to 3% is satisfactory to drain a feedlot without causing excessive buildup of soil in the storage lagoon (Cook). Soil types vary from fine-textured soils (like clay) to sandy soils. Most states require that a record of soil type underlying the proposed feedlot be filed with a state office.

VI.

Feedlot Operational Issues

Labor Requirements

The team of workers for a feedlot are critically important to its successful operation. Since successful feedlot operation requires careful attention to every detail, skilled workers are indispensable. It would seem prudent to hire a manager with extensive and successful experience in operating a large feedlot.

The duties of the manager consist of overseeing the entire operation. The manager is expected to conduct business with creditors, customers, and the board of directors. Buying and selling decisions concerning cattle, feed, and other inputs must be made in a timely and responsible manner. The manager is responsible for the oversight of personnel in each area of operation. Future working and expansion plans are to be developed and implemented. The manager needs to supervise the environmental protection plan of the feedlot.

The assistant manager is responsible for the day-to-day operation of the feedlot. This individual maintains inventory of all needed supplies. The assistant manager is responsible for managing the cattle, feed, and maintenance teams, developing nutrition programs and least-cost-rations, and overseeing the cattle health and performance plans.

The secretary/accountant is responsible for maintaining personnel information and payroll. The secretary is to conduct receptionist, secretarial, and accounting duties of the feedlot.

The head cow handler and assistants are responsible for processing cattle upon arrival to the feedlot. They need to check cattle daily, remove sick cattle to the hospital area, and treat cattle in the hospital. The daily operation of the handling facili-

There is a trend for local governments to impose more stringent pollution controls.

ties, the cleaning of pens, and the support of other areas when needed are also required.

The duties of the feed team include operating and maintaining the feed mill, delivering feed to bunks, conducting quality assurance of feed ingredients, and maintaining records of feeds received and fed.

The maintenance team is responsible for maintaining facilities and equipment as required, including feed yard maintenance and general repair of machinery and yard.

Table 10 shows the labor requirements for various sizes of feedlots. The salaries listed include fringe benefits. The base salaries may be lower with incentive pay for performance. Labor costs are a substantial portion of the costs associated with cattle feeding. The larger lots have an advantage over the smaller lots because of increased worker mechanization, efficiency, and specialization. The labor cost per head of cattle on feed declines from $52 per head for the 1,000 head lot to $23.38 per head for the 20,000 head lot.

Feedlot operators we interviewed indicate that most feedlot workers, except for the manager and the assistant manager, were hired from within the broader community. Most workers stayed in their jobs for several years. Workers received benefit plans that included health insurance and 401K plans. Not infrequently, the employment arrangement included use of a house on the farm and, occasionally, the use of a pickup truck.

Feeding Rations

Separate rations for cattle feeding were prepared using a spreadsheet program developed by the Department of Animal Science at the University of Oklahoma (Owens and Gill). Growing rations are used for calves with beginning weights of about 550 lbs and finishing rations are used for cattle with beginning weights of about 700 lbs. Traditionally, a growing ration consists of 75% roughage, alfalfa, mix hay, or straw, and 25% grain or concentrate. The finishing ration consists of 20% roughage and 80% grain. Various rations utilizing corn, barley, corn gluten feed, (CGF), alfalfa, and wheat straw were developed.

Table 11 shows the ration formulations, weight gain assumptions, and cost/lb of gain. For the analysis, corn is priced at $4 bu, barley at $3 bu, alfalfa hay at $60/ton, and wheat straw at $20/ton. CGF contains about 20% crude protein, more than twice that of corn, and about 92% the energy of corn (Firkins). CGF can be fed either dry (90% dry matter) or wet (55% dry matter).

The growing ration is fed to calves for about 45 days to prepare the calves for the finishing rations. All feeds are listed on dry matter basis. The growing ration consists of 12.5 lbs of CGF, 4 lbs of alfalfa hay, and 3.5 lbs of wheat straw. For the growing ration, the cost per cwt of feed is $5.25, and the daily gain is 3.47 lbs. The finishing ration consists of 4 lbs barley, 8 lbs corn, and 3 lbs wheat straw. The cost of the finishing ration is $6.84/cwt of feed while the daily gain is 3.54 lbs.

Table 12 shows the price relationships developed by the ProGold Corn Processing plant. Dry CGF will be priced at 80% of the price of corn. Corn will be purchased by ProGold at the average market price of five area elevators. Wet CGF will be priced at 37 1/2% the price of corn (Midwest Marketing). The price advantage that wet CGF has over dry CGF depends on the price of corn. For example, at a corn price of $2.40/bu, wet CGF has a $5.71/ton price advantage over the dry CGF. At $4/bu for corn, the price advantage is $9.52/ton.

Wet CGF does present some handling and storage problems. Transportation costs are higher because of the amount of water that is being transported from the plant to the feedlot. Wet CGF does not store well for an extended period at the feedlot. During the warmer periods of the year, the feed will spoil after 5 to 10 days of storage (Firkins). During the winter, spoilage is not a problem, but freezing of the material is. The Carrington Research Extension Center has conducted research using wet distillers grain (WDG). The center found handling WDG during the winter does not present a problem if procedures are implemented to retain the latent heat within the WDG (Anderson).

The feeding rations presented in the study are intended to utilize Northern Plains feed sources and to achieve the aggressive daily rates of gain used in the analysis of the returns to cattle feeding. Based on research at the Carrington Research Center, both of these objectives are achievable.

Networking Alternatives

A network is a collaborative venture among enterprises that helps individual enterprises expand markets, increase value-added or productivity, stimulate learning or improve long-term market position.

Networks can be categorized into three groups (Borst): 1) vertical networkswhere firms produce different stages of the same final product; 2) horizontal networks where firms produce the same products and have similar needs for technologies, expertise, and services, and 3) knowledge networks where firms seek and use new information, increase their understanding of business practices, and share information with network partners where it is mutually useful. Many networks among farmers are organized as cooperatives. A number of farmer networks were identified through interviews with feedlot operators.

Two networking arrangements were discussed with southern Iowa beef producers. Precision Beef has been incorporated as a non-profit corporation in Iowa. It focuses on providing cooperating farmers detailed feeding performance and carcass data on their fed cattle. A primary objective of the organization is to help farmers improve the genetics and management of their cattle herds so that their cattle perform more efficiently on feed and so that a high proportion of the carcasses of these animals meet slaughter plants' requirements for specified grade and yield. If that can be achieved, slaughter plants may be able to pay a higher price for the cattle from farms enrolled in Precision Beef. Precision Beef functions like a dairy herd improvement association, and its recommendations are voluntary. At some future time, non-cooperating farmers may be denied access to feedlots enrolled in the Precision Beef Program.

Precision Beef is custom slaughtering a limited number of fed cattle to supply a small supermarket chain in Iowa, where the beef is sold under the supermarket chain's brand name. Precision Beef members hope that program might grow larger; and, if customer demand for this branded beef product is high, they hope to see a somewhat stronger demand for the fed cattle they produce under this program. However, at this time, there is no evidence that farmers are receiving higher prices for their fed cattle as a result of the program. Precision Beef has not created a branded product of its own, but instead relies on branded products created by supermarket chains to spur beef demand. It is conjectural whether that strategy will increase higher fed cattle prices.

To increase the supply of fed cattle in Iowa, another group of livestock producers is exploring the feasibility of developing and operating a 5,000 head cooperatively owned feedlot. Projected construction costs may limit the profitability of the operation, however.

Table 10. Labor Requirements for the 1,000, 5,000, and 20,000 Head Feedlots

	- - - - - - - Number of Head - - - - - - -					
	1,000		5,000		20,000	
Position	**No.**	**$**	**No.**	**$**	**No.**	**$**
Management Team						
Manager	1	35,000	1	70,000	1	70,000
Assistant Manager	1	17,000	1	17,000	1	26,000
Secretary/Accountant					1	17,000
Cattle Team						
Head Cow Handler			1	26,000	1	26,000
Assistant			1	17,000	2	17,000
Pen Rider					3	26,000
Feed Team						
Feed Mill Operator			1	26,000	2	26,000
Feed Truck Driver			1	17,000	4	17,000
Maintenance Team						
Head Mechanic					1	26,000
Assistant					2	17,000
Head Yard					1	26,000
Yard Maintenance					2	17,000
Total Employees	2		6		21	
Total Payroll		52,000		173,000		491,000
Labor Cost / Head		**52.00**		**28.83**		**23.38**

Table 11. Growing and Finishing Rations for 550 lb Calves to Finish With Various Formulations, Dry Matter Basis

Feed Item	**Growing Dry Matter**	**Finishing Fed per Day**
	- - - - - - - lbs - - - - - - -	
Corn Gluten Feed	12.5	8.0
Barley		4.0
Corn		8.0
Alfalfa Hay	4.0	
Wheat Straw	3.5	3.0
Limestone 38%	0.05	0.15
Salt	0.10	0.10
Rumensin 80	0.018	0.018
Vitamin E-50%	0.0022	0.0022
Vitamin A-30,000	0.0223	0.0223
Manganous Oxide		0.0010
Total Fed	20.1925	23.2935
Cost per cwt of feed	$5.25	$6.84
Daily Gain	3.47	3.54

Table 12. Corn and Corn Gluten Feed Price Relationship

Corn	**Dry Corn Gluten 12%**	**Wet Corn Gluten 45%**	**Wet Corn Gluten at 12% dry**	**Savings Wet Over Dry**
$/bu	- - - - - - - - - - - - - - -	**$/ton**	- - - - - - - - - - - - - - -	
2.40	68.57	32.14	62.86	5.71
3.00	85.71	40.18	78.57	7.14
3.50	100.00	46.87	91.67	8.33
4.00	114.29	53.57	104.76	9.52

Source: ProGold market position.

Still another strategy being explored in Iowa is marketing organic beef. This program is just being organized and depends upon USDA's declaration of standards for organic beef. The plan is to market this beef into the organic market, a narrow niche market, through a growers' cooperative. In this way, the members hope higher fed cattle prices can be realized for their cooperative. There is no plan to create their own branded product and to develop brand equity for the cooperative as the organic beef product's consumer acceptability grows.

In Minnesota, 17 feedlots provide fed cattle to a nearby processing plant. The plant slaughters exclusively for an East Coast chain of 27 food stores. The meat is sold as a branded product of the food store chain. The food store chain, the processors, the 17 cattle feedlot operators, and associated ranchers meet regularly to plan strategies to improve quality and consumer acceptance of the meat being produced. Stringent quality standards and strategies to achieve those are implemented. Feedlots that do not meet required standards of quality in the animals marketed may be denied access to sell to the slaughter plant. Some cattle feeders interviewed believe this example of vertical coordination represents a viable and necessary strategy for the cattle industry.

We identified no examples of independent farm-size cattle production and feeding with joint marketing of fed cattle in which premium prices were paid by slaughter plants nor did slaughter plants respond with higher prices to one-time offers of large blocks of fed cattle. Instead, slaughter plants are primarily interested in buying from sufficiently large-size feedlots that can offer more than one pen of fed cattle for sale each week. Slaughter plant buyers visit these feedlots each week and later submit bids on the cattle. Buyers often bid on cattle during a time frame as narrow as two hours of one day each week. Miss the time frame, and the feedlot must wait until the next week to sell cattle.

Vertical coordination arrangements hold significant promise.

In short, the interviews revealed no successful horizontal networking examples. Feedlot operators told us it was unlikely these would be successful, because of the careful coordination and management control needed for successful cattle feeding. Many of the cattle feeders interviewed did suggest vertical coordination arrangements between ranchers and feedlot operators and between feedlots and slaughter plants hold significant promise. This latter strategy is, however, controversial with many feedlot operators who object to the perceived market power of large slaughter companies.

If vertical networking is to be successful in the Northern Plains, farmer cooperatives may be the preferred form of business organization to accomplish successful networking. Cooperatives appear to be well-suited for value-added and vertical networking ventures in the Northern Plains for the following reasons:

- Cooperatives are well-accepted by farmers.
- The cooperative business structure has enabled farmers to raise equity capital for large scale, value-added ventures.
- Northern Plains farmers are enthusiastic about closed membership cooperatives which have demonstrated success in managing complex business enterprises.

Financing the Feedlot

Commercial banks, the Farm Credit System, and Banks for Cooperatives typically supply the majority of the capital needs of a commercial feedlot. The feedlot may be owned by individuals, partnerships, limited liability companies, corporations, or cooperatives. Feedlots may be owned by large vertically integrated firms which may also be in the grain business, as well as in the slaughter and meat processing business.

Financing the cattle industry, although specialized, is relatively easy compared to other industries that require similar amounts of capital. Banks are attracted to the industry because the primary collateral, the cattle, are easily liquidated and their value can be determined at any given time. Also, various market-based strategies can be employed to fix the price of inputs and the price of the finished product.

Financing for fixed investment in feedlots is, however, more difficult to acquire, since feedlots have specialized uses and are not readily converted to other uses. The cattle feedlot operators interviewed indicate that they prefer to maintain $2 of equity in the business for each $1 of debt. Most of these operators have built equity into their business over an extended period.

Financing the feedlot industry can be divided into two areas: term loans for financing of the facilities and the loans for operating capital. Term loans for the construction of facilities usually have maturities of 15 to 20 years. The amount loaned as a percent of the construction and development cost depends on several factors. Two of the most important factors are 1) the profitability of the industry at the time the financing is arranged and 2) the management experience of the ownership group in the cattle industry (Cook, J.R.).

The Saint Paul Bank for Cooperatives indicated it can lend feedlot developers up to 50% of the cost of the feedlot and of the funding needed for feedlot operation. That implies a substantial amount of equity capital that would be required for a new feedlot.

Feedlot operators and lenders revealed during the interviews that most cattle on feed are owned by persons other than the owners of the feedlot. Custom feeding represents an important risk minimization strategy by feedlot operators. For example, we were told that about 70% of the cattle fed in southwest Kansas were owned by persons outside Kansas.

Substantial amount of equity capital would be required for a new feedlot.

VII.

Feeding Profitability

This section discusses the profitability of cattle feeding under three assumptions about fed cattle prices and three corn price levels. The profitability is evaluated under different feedlot sizes, feeding cattle to slaughter weights as compared to backgrounding cattle, and feeding dairy calves. While other combinations of cattle and feed prices could be considered and other feedlot sizes evaluated, the examples presented here provide an evaluation of cattle feeding under the most likely price scenarios for feed grains and fed cattle.

Return to Equity and Risk

The return to equity and risk was calculated using three prices for corn, $3, $2.50, and $2 per bushels and three prices for fed cattle, $65, $70, and $75 per cwt. Owner equity in the feedlot, equipment and cattle is assumed to be 50%. The interest rate for long- and intermediate-term debt is 10%. The interest rate for the purchase of cattle is 10.5%. These interest rates are similar to those charged by banks and FCS associations. Depreciation costs are calculated using the projected life for the feedlot and equipment. It is assumed that in one year a 550-lb feeder would be fed a growing ration and a finishing ration, sold at 1,200 lbs, and then replaced with another 700-lb feeder that also would be finished and sold at 1,200 lbs.

Average daily weight gain for cattle on feed is 3.47 lbs for growing and 3.59 lbs for finishing. The rates of gain are aggressive and would require excellent management to achieve. However, research at the Carrington Research Center indicates such gains are achievable. The Cooperative Extension Service at North Dakota State University noted that North Dakota cattle feeders obtain rates of gain ranging from 3.2 to 3.3 lbs per day. Death loss was assumed to be 1.5%, and shipping shrinkage would be 5%.

Table 13 shows the return to equity and risk, when assuming transportation distance of 100 miles to ship calves and feeders into the feedlot and 150 miles to ship fed cattle to a local slaughter plant or 340 miles to a slaughter plant in Dakota City,

Nebraska. The freight charges for a 49,000 lb load cattle are calculated at $1.90 per loaded mile (Hanefeld Bros., Inc., West Fargo) to determine the cattle shipping charges. These figures indicate the returns to equity and risk at full feedlot capacity. Table 14 shows the return to equity and risk at 80% feedlot capacity.

Table 13 shows there are economies of scale in cattle feeding. For example, at 150 miles shipping to a slaughter plant at $2.50 corn and $70 cwt fed cattle, the 1,000 head feedlot loses $25.10 per head times the lot capacity or a loss of $25,100 per year. If a 7% return on equity (the interest rate on long-term U.S. Treasury bonds), is assessed, the return to risk on a per head of capacity basis is a negative $58.13.

The 5,000 head feedlot returns $25.19 per head of capacity or $125,950 per year. If a 7% return on equity is assessed, the return per head of capacity is a loss of $0.47.

The 20,000 head feedlot returns $38.84 per head of capacity or $776,800 per year. If a 7% return on equity is assessed, the return per head of capacity is $15.13.

Shipping fed cattle 340 miles to a Dakota City, Nebraska, slaughter plant at $2.50 corn and $70 cwt fed cattle, the 1,000 head feedlot loses $47.34 times the lot capacity or a loss of $47,340 per year. If a 7% return on equity is assessed, the return per head of capacity is a negative $80.37.

The 5,000 head feedlot returns $2.95 per head of capacity or $14,750 per year. If a 7% return on equity is assessed, the return per head of capacity is a negative $22.71.

Table 13. Net Return Per Head Capacity to Equity and Risk for Various Feedlots, Two Groups of Cattle Fed Per Year

Cattle price	Corn price $/bu		
$/cwt	3.00	2.50	2.00
1,000 Head Feedlot			
150 miles shipping to local slaughter plant			
75	-72.76	-3.81	**65.14**
70	-94.04	-25.10	**43.85**
65	-115.29	-46.34	**22.61**
340 miles shipping to Dakota City, NE			
75	-95.00	-26.05	**42.90**
70	-116.29	-47.34	**21.61**
65	-137.53	-68.58	**0.37**
5,000 Head Feedlot			
150 miles shipping to local slaughter plant			
75	-22.46	**46.49**	**115.44**
70	-43.76	**25.19**	**94.15**
65	-64.99	**3.96**	**72.91**
340 miles shipping to Dakota City, NE			
75	-44.70	**24.25**	**93.20**
70	-66.00	**2.95**	**71.91**
65	-87.23	-18.28	**50.67**
20,000 Head Feedlot			
150 miles shipping to local slaughter plant			
75	-8.81	**60.14**	**129.09**
70	-30.11	**38.84**	**107.79**
65	-51.34	**17.61**	**86.56**
340 miles shipping to Dakota City, NE			
75	-31.05	**37.90**	**106.85**
70	-52.35	**16.60**	**85.55**
65	-73.58	-4.63	**64.32**

7% Return on Equity has not been subtracted, $33.03 for the 1,000 head lot, $25.66 for the 5,000 head lot and $23.71 for the 20,000 head lot; 100 miles shipping into lot

Table 14. Net Return Per Head Capacity to Equity and Risk for Various Feedlots, Two Groups of Cattle Fed Per Year, 80% Capacity

Cattle price	Corn price $/bu		
$/cwt	3.00	2.50	2.00
1,000 Head Feedlot			
150 miles shipping to local slaughter plant			
75	-109.50	-29.60	**43.00**
70	-130.70	-50.89	**21.71**
65	-152.00	-72.13	**0.47**
340 miles shipping to Dakota City, NE			
75	-131.70	-51.84	**20.76**
70	-153.00	-73.13	-0.53
65	-174.20	-94.37	-21.77
5,000 Head Feedlot			
150 miles shipping to local slaughter plant			
75	-58.23	**21.67**	**94.27**
70	-79.53	**0.37**	**72.98**
65	-100.70	-20.86	**51.74**
340 miles shipping to Dakota City, NE			
75	-80.47	-0.57	**72.03**
70	-101.70	-21.87	**50.74**
65	-123.00	-43.10	**29.50**
20,000 Head Feedlot			
150 miles shipping to local slaughter plant			
75	-27.31	**35.67**	**108.27**
70	-65.53	**14.37**	**86.97**
65	-86.76	-6.86	**65.74**
340 miles shipping to Dakota City, NE			
75	-66.47	**13.43**	**86.03**
70	-87.77	-7.87	**64.73**
65	-109.00	-29.10	**43.50**

7% Return on Equity has not been subtracted, $33.03 for the 1,000 head lot, $25.66 for the 5,000 head lot and $23.71 for the 20,000 head lot; 100 miles shipping into lot

The 20,000 head feedlot returns $16.60 per head of capacity or $332,000 per year. If a 7% return on equity is assessed, the return per of head capacity is a negative $7.11.

Break-even Prices for Feeder Cattle and Calves

Table 15 outlines projected break-even prices for feeder cattle and calves at three alternative corn prices and three alternative fed cattle prices. These prices are developed for three different feedlot sizes. These prices indicate the projected maximum prices that could be paid for feeder cattle or calves and still fully cover all fixed and variable costs of the cattle feeding operation. Purchases of feeder cattle or calves at these break-even prices mean that **no profits** are earned in cattle feeding. There are zero returns to the equity investment in the feeding operation and zero returns to entrepreneurship.

For example, at $2.50/bu corn and $70/cwt fed cattle, feedlot operators of a 1,000 head lot are able to break even if they purchase 700-lb feeder cattle at $76.53/cwt or 550-lb calves at $79.69/cwt. The break-even prices for the 5,000 head lot are $81.56 for feeder cattle and $84.72 for calves. The break-even prices for the 20,000 head lot are $82.96 for feeder cattle and $86.12 for calves.

Table 15. Break-even Price for Feeder Cattle and Calves at Various Fed Cattle and Corn Prices

Fed Cattle Price	Feeder Cattle Price			Calf Price		
	($/bu)					
Corn Price	3.00	2.50	2.00	3.00	2.50	2.00
	$/cwt					
1,000 Head Feedlot						
75	78.27	85.16	92.05	83.29	90.17	97.07
70	69.64	76.53	83.43	72.79	79.69	86.58
65	61.02	67.91	74.81	62.31	69.21	76.10
5,000 Head Feedlot						
75	83.29	90.19	97.08	88.30	95.20	102.10
70	74.67	81.56	88.46	77.82	84.72	91.61
65	66.05	72.94	79.84	67.34	74.24	81.13
20,000 Head Feedlot						
75	84.69	91.59	98.48	89.71	96.60	103.50
70	76.07	82.96	89.86	79.22	86.12	93.01
65	67.45	74.34	81.24	68.74	75.64	82.53

Backgrounding Calves

An alternative to feeding cattle to slaughter weight in the Northern Plains is to background calves for sale to feedlots in the Platte River Valley of Nebraska, where they would be fed to slaughter weights. The following analysis discusses the profitability of backgrounding calves.

Table 16 shows the return to equity and risk assuming 300 miles shipping for calves brought into the feedlot and 450 miles for shipping backgrounded calves to feedlots in the Platte River Valley in Nebraska. A freight charge for a 49,000 lb semi-tractor load of cattle of $1.90 per loaded mile (Hanefeld Bros., Inc., West Fargo) was used to calculate the shipping charge.

The 1,000 head feedlot was used to calculate profitability. It was assumed that 1,200 calves at a time would be fed for about 50 days. Seven groups of calves would be fed per year, for a total of 8,400 backgrounded calves. For example, at $2.50 corn and $70 cwt fed cattle, backgrounding returns $87.95 per head times the lot capacity or $86,980 per year. Table 13. shows the price relationships between fed cattle, feeder cattle, and calves. Even at $3.00 corn and $65 fed cattle, the return is $45.98 per head of lot capacity. If a 7% return on equity is assessed, the return per head of capacity is $59.41 when corn is $2.50 and fed cattle are $70 cwt and $17.44 when corn is $3.00 and fed cattle are $65 cwt.

Positive returns per head of capacity would have been even higher using a 5,000 or 10,000 head lot size. However, given the requirement of several turns of backgrounded calves in the lot each year, a larger lot size would require a larger geographic area from which to acquire calves.

Dairy Cattle Feeding

Dairy cattle are fed to supply a market with different quality expectations than is true for beef cattle. Dairy cattle are discounted in both the calf markets and the fed markets. With fed cattle price at $70, fed dairy cattle will average $64.56 per cwt. Dairy calves average $62.22 when the beef feeder calves price is $82.20 per cwt. Table 17 shows the return to equity and risk assuming 100 miles transportation to ship dairy calves and feeders into the feedlot and to ship fed dairy cattle 150 miles to a slaughter plant. A freight charge for a 49,000 lb load at $1.90 per loaded mile (Hanefeld Bros., Inc., West

Fargo) was used to calculate the shipping charge. Assuming $70 fed cattle price and $2.50 corn, the returns from feeding dairy cattle are less than for feeding beef cattle.

Dairy calves are fed from 400 lbs to 750 lbs on a growing ration similar to beef calves. Dairy feeder cattle are finished at heavier weights than beef cattle (Ensminger). They were assumed to be finished at 1,350 lbs. The rates of gain and rations were similar to beef cattle. However, feeding to heavier weights added to feeding time in the feedlots. For example, at 150 miles shipping to a slaughter plant at $2.50 corn and $70 cwt fed cattle, the 1,000 head feedlot loses $68.07 per head times the lot capacity or a negative $68,070 per year. If a 7% return on equity than for feeding beef cattle.

The 5,000 head feedlot loses $4.26 per head of capacity or a negative $21,300 per year. If a 7% return on equity is assessed, the return per head of capacity is a negative $29.92.

The 20,000 head feedlot returns $12.82 per head capacity or $256,400 per year. If a 7% return on equity is assessed, the return per head of capacity is a negative $10.89.

Table 16. Net Return Per Head Capacity to Equity and Risk for Backgrounding Calves in 1,000 Head Feedlot, Seven Groupsof Cattle Fed Per Year

Cattle price	Corn price $/bu		
$/cwt	3.00	2.50	2.00
450 miles shipping to feedlot in Platte River Valley			
Full capacity			
75	**35.57**	**82.94**	**130.32**
70	**40.58**	**87.95**	**135.33**
65	**45.98**	**93.35**	**140.72**
80% Capacity			
75	**4.67**	**52.04**	**99.42**
70	**9.68**	**57.05**	**104.43**
65	**15.08**	**62.45**	**109.82**

300 miles shipping into lot
7% Return on Equity ($25.57) has not been subtracted

Cattle Feeding in Northern States vs. Kansas

An important issue for Northern Plains States cattle feeding is whether a cost difference exists between that region and the Southern Plains States for cattle feeding. This section evaluates that issue.

Table 18 shows the differences in feeding costs between Kansas and North Dakota as surrogates for the respective regions. It is assumed that a 550-lb calf is purchased, shipped to the feedlot, and fed for 191 days. The average shipping distance for calves purchased for feeding in the Southern Plains is assumed to be 300 miles. The trucking charge for cattle between the feedlots and the slaughter plants in Kansas is $1.90 per loaded mile (Daubert Trucklines, Sublette, KS). The shipping distance for calves purchased for North Dakota feedlots is assumed to be 150 miles. The trucking charge for cattle in North Dakota is $1.90 per loaded mile.

The per head daily feedlot charge is obtained from *Livestock and Poultry Situation and Outlook* for Southern Plains, and the cost estimates for Northern Plains feeding costs reported in the preceding section.

The feeding cost comparisons between Kansas and North Dakota presented in Table 18 take into account all the costs associated with feeding cattle, including the differences in feed grain costs between the two regions. The rations include the

Table 17. Net Return Per Head Capacity to Equity and Risk for 1,000, 5,000, and 20,000 Head Feedlot, Two Groups of Dairy Cattle Fed Per Year

Cattle price	Corn price $/bu		
$/cwt	3.00	2.50	2.00
1,000 Head Feedlot			
75	-111.23	-29.40	**52.45**
70	-149.91	-68.07	**13.76**
65	-185.75	-106.13	-22.08
5,000 Head Feedlot			
75	-47.41	**34.42**	**116.26**
70	-86.09	-4.26	**77.58**
65	-121.93	-42.31	**41.74**
20,000 Head Feedlot			
75	-30.33	**51.50**	**133.34**
70	-69.01	**12.82**	**94.66**
65	-104.86	-25.24	**58.82**

7% Return on Equity has not been subtracted, $33.00 for the 1,000 head lot, $25.66 for the 5,000 head lot and $23.71 for the 20,000 head lot
100 miles shipping into lot
150 miles shipping to slaughter plant

use of by-products. Differences in by-product costs would be based upon the differences in feed grain costs.

Daily feed costs were calculated using $3 for corn in Kansas and $2.76 for corn in North Dakota. The cattle are fed for 191 days with a 1.5% death loss. Interest was calculated on ½ of the calf purchase price plus ½ of the cost of feed consumed during the feeding cycle. Southern Plains feedlots ship cattle about 100 miles to slaughter plants. In North Dakota, feedlots will ship fed cattle about 340 miles to slaughter plants.

The total cost for Kansas feeding was $764.41 per head and for North Dakota, $752.39 per head. Because of differences in transportation distance and time, shrinkage was assumed to be 3% for Kansas and 5% for North Dakota. The net return for Kansas feeding was $50.39 per head and for North Dakota, $45.61 per head. Even though feed costs are less in North Dakota by $0.13 per day, shipping costs are substantially higher in North Dakota, resulting in a return of $4.78 per head less than in Kansas.

Table 18. Feeding Cost Comparison Between Kansas and North Dakota Feedlots

	KS	ND
550 lb Calf @ 82.20 cwt	452.10	452.10
Shipping	(300 miles)6.40	(150 miles)3.20
Feed lot Charge/day ($)	0.26	0.30
Feed cost/day ($)	1.24	1.11
Average Daily Gain (lbs)	3.41	3.41
Days on Feed	191	191
Death Loss (%)	1.50	1.50
Interest ½ (Calf+Feed)	24.92	23.63
Shipping	(100 miles)4.63	(340 miles)15.75
Total cost ($)	764.41	752.39
Shrinkage (%)	3.00	5.00
Fed Cattle price @ 70 cwt	814.80	798.00
Gross return ($)	**50.39**	**45.61**

Cost of shipping fed cattle are higher in North Dakota.

VIII.

Developing a Cattle Feeding Cooperative

The resources needed to construct and operate a feedlot can be extensive. If a goal is to feed cattle in a locally owned facility, one alternative is for farmers to pool their resources of capital, cattle, and feed. Such an arrangement allows them to develop a facility that offers economies of scale that few farmers could afford to build individually. Initial challenges are to organize the farmers, gather the needed resources, construct the facility, and initiate operation.

The following discussion proposes a procedure for farmers to use in considering whether to develop a cooperatively owned feedlot. Although the discussion implies an order in which to complete the steps, the sequence of events will vary according to the situation and as a result of the interrelationships among the activities. The discussion also suggests points in the process when the organizers will have to decide whether to continue to develop the cooperative. These are perhaps the minimum number of decision points; the cooperative organizers may find that they will have to decide more frequently whether to continue the project.

Organizing Discussions and Defining the Project

- Cooperative organizers should select interim leadership (a steering committee) to guide the organizing discussions.
- The group will want to set parameters for the project to define which ideas they will investigate; for example, will the group investigate establishing a feedlot for finishing cattle, or a feedlot for backgrounding feeders?
- Have the group set goals for project; for example, is their goal for the project to generate a profit for investors, to provide employment opportunities in the community, or both? Similarly, is the goal of the project to provide a market for feeder cattle, for feed, or for both?
- Establish a timetable for each step of the process and determine the level of commitment necessary to justify moving to the next step.

- Discuss how much the organizers are willing to invest in studying the opportunity, if and how they will receive a return on that investment if the cooperative does become operational, whether there are sources of "seed money" for the study phase, and who will apply for that assistance.

Initial Feasibility Assessment

Conduct a "windshield" assessment of the project, informally gather information and survey interests without much public exposure.

- *Market for Fed or Backgrounded Cattle*. Visit with potential buyers to ascertain their reactions and interests when investigating the market for backgrounded cattle or fed cattle; are there finishing feedlots for backgrounded cattle, are there nearby slaughter plants for fed cattle? Are there retail outlets interested in establishing a relationship with a feedlot and packer?
- *Availability of Inputs*. Visit with potential suppliers to ascertain their reactions and interests, and determine availability of feeder cattle and feedstuffs with which to feed the cattle. Are there ranchers or feed producers who are interested in a working relationship with a feedlot? This step may include a survey of producers. The survey may request information on the amount of equity investment that farmers would be willing to make in such a cooperative.
- *Availability of Workers*. The group may find that it will need to hire an experienced feedlot manager from another region. The group may also need to retain a nutritionist on a consulting basis. These individuals do not need to be hired or retained at this time; but the group may find it will have to attract key individuals from outside the region.
- *Location*. Consider the location of the proposed feedlot relative to feeder cattle, feedstuffs, and slaughter plants in order for a proposed feedlot to have a realistic potential for profitability.
- *Size of Operation*. What are the alternative sizes of operation for the feedlots? Which size feedlot offers the best economies of scale? What is the minimum size necessary to earn an acceptable rate of return? At what size are diseconomies of scale likely to be experienced? What size of operation are the communities and permitting agencies willing to accept?
- *Capital Needs*. Is the necessary capital available? Determine the investment required to develop/construct and operate the desired size of feedlot.
- *Organizational Structure*. Who will be eligible for membership in the cooperative; that is, who will be the investors? What will be the minimum and maximum investment? Will they be cattle producers, feed producers, or both? The organizers will need to decide whether a closed or an open membership cooperative will be proposed to investors. These decisions should reflect the group's goals.

Decision 1

Does the preliminary information justify a decision to continue to study the project by completing a formal feasibility assessment? Has an adequate general description of the project been developed so a detailed study can proceed? What is the general description of the project? Will it finish cattle or background them? What will be the feedlot's size of operation?

Are producers willing to work together? Will they support the cooperative after it begins operating? These questions likely will be discussed and answered at a meeting of the organizers.

Detailed Feasibility Study

With this preliminary set of information, the group is ready to complete a formal feasibility study to determine profitability and feasibility (cash flow). This study will include **market** and **financial analyses**. A thorough market analysis is critical for new businesses. The feasibility study must be done by an unbiased company, persons, or group; or it must be reviewed by an unbiased source.

The group likely will consider retaining a consultant to assist in the market and financial analyses.

- *Finalize Business Plan*. Develop a formal business plan to accompany disclosures, permit applications, and loan applications. Finalizing the business plan will require that the organizers resolve questions similar to those described below:

  Organizers should determine whether all cattle fed in the cooperative feedlot will be owned by the feedlot, or whether the feedlot also will feed cattle owned by stockholders in the feedlot. Organizers should decide whether any custom feeding of cattle will be undertaken for farmers or livestock investors who are not stockholders in the cooperative. Feeder cattle will be required by the feedlot on as frequent as a weekly schedule and on no less than a monthly schedule. Feeding

to finish in the lot would require two turns of cattle per year, while backgrounding would require about seven turns of cattle per year. Thus, the business plan should clarify that potential stockholders may need to adopt new management practices on their own ranches, including staggered calving times across the year, to assure that they will be able to supply the necessary calves and feeder cattle to the cooperative feedlot.

The method of determining value of feeder cattle purchased by the feedlot from its stockholders must be agreed upon and explained; for example, cattle could be priced by an outside order buyer or by an order buyer employed by the feedlot.

Marketing strategies for fed cattle sales must be developed. Will fed cattle be marketed to a single slaughter plant, based on preferred supplier arrangements with the packer, or will fed cattle be marketed to whomever provides the highest bid when the cattle are ready for sale?

The par value of equity stock shares must be determined, along with a definition of the investors' obligations to supply cattle or feed to the feedlot.

Decision 2

Does the project appear feasible? If the project appears to be reasonable, the next step is to revisit many of the same issues in more depth and to construct the feedlot. This will involve organizing the cooperative, arranging equity and debt capital, completing detailed studies of potential sites, acquiring the selected site, applying for necessary permits, constructing the facility, negotiating with suppliers and buyers, and hiring employees.

Capitalization Phase

The group is now ready, based on the business plan, to develop necessary documentation of the project to prepare an information package for potential investors and for lenders. Based upon the success of this phase, the project can either move forward to the construction phase, be rethought, or abandoned.

- Retain professionals necessary to complete the project; for example, an attorney, construction engineer, and financial/business planner.
- *Form the Cooperative*. An attorney skilled in formation of cooperatives should be employed to assist in setting up and organizing a board of directors for the prospective cooperative, to develop the cooperative feedlot information packages for potential investors, to attend to needed legal requirements associated with marketing the cooperative proposal, and to negotiate loan agreements, siting permits, construction contracts, and trademark registration. A financial advisor should also be employed to assure that business reality is reflected in the information packages provided potential investors.
- *Financing.* Formal documentation for the stock offering and loan applications will need to be completed; some of this will have already been developed as part of the business plan.

  Solicit equity investors. Potential farmer equity investors in the feedlot must be identified. A series of informational and sign-up meetings should be held to discuss the proposal and to sell shares in the cooperative. Provision for returning money invested must be clearly indicated if the membership target is not met within a specified time period.

  Negotiate for debt capital. As stock sales meet specified levels, discussions should proceed with potential lenders regarding loan amounts, covenants, maturity, and price. Lenders will likely specify a level of equity for the individual investors before they will consider the loan application.

  Organizers should also investigate state and local economic development assistance alternatives that could be included in a debt capital package. Some assistance packages may also include contributions to the required equity levels.

Decision 3

Can the project be capitalized?

If the project organizers have been successful in obtaining the necessary equity capital, and if lenders have given approval to the necessary loans to provide debt capital, the project is ready to proceed to the construction phase. Alternatively, if either equity capital or debt capital has not been secured, project organizers must re-evaluate the project proposal. The proposal must be adapted to fit available capital, postponed, or abandoned.

The permanent CEO should be recruited and in place before the start of the construction phase.

Construction Phase

- *Location.* A specific site for the proposed feedlot should be identified and purchase options secured on the land necessary for the feedlot.
- *Business Contracts*. The cooperative's management will want to negotiate necessary contracts with input suppliers and product buyers. A contract will not be needed for all suppliers and buyers; the primary focus may be on those firms whose long-term commitment is critical to the success of the cooperative. The negotiations are an opportunity for the group to help suppliers understand how the suppliers can meet the needs of the cooperative.
- *Construction Design*. An engineer, along with the CEO or production committee, will study selected sites and design a feedlot facility.
- *Prepare to Operate*. The CEO will develop delivery schedules for feeder cattle and inform shareholders in preparation for feedlot start-up.

Questions Investors Should Consider

In addition to the steps outlined above, farmers and ranchers interested in forming a cooperative feedlot also should ask at least five questions regarding the impact of that investment on their own farm and ranch businesses. The following five questions are from a July 1996 publication, *Five Questions to Ask Before Joining a New Processing Cooperative,* of the Quentin Burdick Center for Cooperatives at North Dakota State University. The questions are as follows:

What are the potential returns from cooperative membership?

What risks is the cooperative business exposed to?

How will cooperative membership influence your farm/ranch operation? Will the business risk you experience in your farm/ranch increase or decrease? Will your farm or ranch business be jeopardized if you lose your investment in the cooperative?

How will your lender view the cooperative investment?

How will cooperative membership impact your personal or business goals?

IX.

Community Impacts

The impacts of developing and operating a feedlot are not limited to the feedlot owners, the livestock owners, and the firms which conduct business with the feedlot. The operation of a feedlot is likely to affect the community and surrounding areas. For example, operating a feedlot requires substantial truck traffic to haul the livestock to and from the feedlot, as well as to haul feed to the site and move waste to a disposal area. This additional traffic impacts others working and living in the community.

The focus of this section is on how communities near feedlots are impacted by cattle feeding. The information in this section is primarily based on results of a survey of feedlot operators, business people, and community leaders. This survey focused on areas of the Great Plains and Middle West where cattle are being fed. These areas included southwestern Kansas, the Platte River Valley of Nebraska, southern Iowa, southwestern Minnesota, and eastern South Dakota. Some of the persons interviewed were from communities that have both cattle feeding and slaughter plant activities. Some of their responses emphasized the impacts of slaughter plants, rather than feeding, because they felt the slaughter plant had a more substantial effect on the community than the feeding activities.

Local Economic Impact of Cattle Feeding

It is often assumed that cattle feeding will have a major economic impact on the community in which it occurs. A major source of overestimation occurs when the sale of locally produced feeder calves and feed grains is attributed to the feedlot. In fact, the feeder calves and feed grain would be sold at prevailing market prices with or without the feedlot being present.

Nonetheless, there is some modest additional community economic impact. Table 19 shows the direct economic impact of the construction of a 20,000 head feedlot. Purchases of labor, material and supplies, and building and equipment available locally amount to $3.79 million, of a total construc-

tion cost of $4.62 million. About 82% of the total construction cost is spent locally. The ongoing annual direct economic return to the community from feedlot operation is $3.94 million for labor, supplies, services, and repairs. The feedstuffs used by the feedlot and calves purchased are not included in the total since these could be sold at prevailing market prices whether or not the feedlot existed.

The value added to cattle that are fed within a community also represents a direct economic impact on that community. That impact can be measured by the profits earned by the feedlot. But, two caveats should be recognized. First, if there are losses rather than profits from cattle feeding, that will have a negative impact on community economic well-being. Second, the economic impact from profits associated with cattle feeding assumes the ownership of the feedlot is within the community. Hence, profits are spent within the community.

If, on the other hand, ownership of the feedlot is outside the community, such as an outside agribusiness firm or outside investors, profits not reinvested in the feedlot business will be spent outside the community. That will reduce the positive economic impact on the community of profitable feedlot operation. Conversely, if feedlot losses accrue to outside owners, the adverse impact of those losses on community economic activity is less than if the feedlot ownership was local.

Using an economic multiplier of three, the benefits for the community of the feedlot construction for a 20,000 head lot are $11.37 million. Using the same multiplier for the annual ongoing economic return from feedlot operation, the benefits for the community are $11.82 million.

However, additional truck traffic on local roads can present an added cost to the local community. The added maintenance on county or township roads as a result of additional truck traffic, delivering calves and supplies to the feedlot, shipping fed cattle to market, and manure hauling, must be largely borne by other taxable property in the county or township. Table 20 shows the impact of the additional truck traffic for a 20,000 head feedlot. That size feedlot adds about 25 semi-truck trips per day over local roads. An Equivalent Single Axle Load (ESAL) is the wear factor of a single axle truck to a road. The typical maintenance cost per ESAL is $0.30 per mile (Tolliver). The load factor for a semi-trailer truck is 2.37 times that of a single axle truck for each loaded and empty mile. The yearly cost of added maintenance as a result of the expected traffic volume of 25 trucks per day is $6,447 per mile for a secondary paved county highway. This cost is paid by the county or township taxpayers with assistance from state and federal revenue sharing.

Table 19. Local Direct Economic Impact of a 20,000 Head Feedlot

Direct Impact	Initial Construction	Operating
	- - - - million dollars - - - -	
Local labor		
Materials and Supplies		
Buildings and Equipment	3.79	3.94/year
Total Impact	**11.37**	**11.82/year**

Broader Community Impacts

The balance of the discussion on community impacts focuses on a broad range of issues related to cattle feeding and, in some cases, slaughter plant activity. These summaries reflect the summary responses.

Impact of Cattle Feeding and Beef Slaughter Plants on Community Business

Cattle feeding does not have a large impact on community businesses, although certain livestock related service businesses do benefit. Beef slaughter, rather than cattle feeding, has a substantial and positive impact on communities in which facilities are located.

Table 20. Impact of Additional Truck Traffic to Highways

	Amount	Number of Tons	Number of Trucks*
Calves shipped in	20,000 head	5,500	225
Feeders shipped in	20,000 head	7,000	285
Cattle shipped out	39,400 head	23,640	960
Feed shipped in		76,650	3,129
Manure shipped out		109,500	4,469
Total Trucks			
Per Year			9,068
Per Day			25
Typical Cost per ESAL[1] per mile	$0.30		
Typical ESALs per Semi-Trailer Loaded and Empty mile	2.37		
Yearly Cost of 25 Trucks per day 365 days per year	$6,447/mile		

*Semi-Trailer, 80,000 lbs gross.
[1]Equivalence Single Axle Load.

Impact of Cattle Feeding and Beef Slaughter Plants on Community Population and Demographics

Little change on either the community work force or population has occurred as a result of cattle feeding. Cattle feeding has little impact on community demographics and has not stopped population out-migration nor the trend to larger farm operations. In many communities, cattle feeding is more readily accepted than confinement hog production.

Unlike cattle feeding, beef slaughter plants have a major impact on communities where they are located. New people settle in communities surrounding a slaughter plant. They often are relatively young, and are likely to have young families. In Kansas and Nebraska, slaughter plants have actively recruited workers of Hispanic and Southeast Asia descent. Worker turnover in beef slaughter plants is quite high, sometimes more than 100% per year. In a state with a very homogeneous population, such as Iowa, communities often do not want slaughter plants larger in size than what can be staffed with indigenous workers living within commuting distance.

Impact of Cattle Feeding and Beef Slaughter Plants on Schools

Cattle feeding has little impact on school population. Beef slaughter plants, however, often attract employees with young families. The cultural diversity such workers bring to a community often requires second language skills in schools and local businesses. But, on balance, community leaders indicate the cultural diversity has been positive for the community and for the schools.

Cattle feeding has a modest, but positive, impact on the community.

Impact of Cattle Feeding and Beef Slaughter Plants on Law Enforcement

Cattle feeding has little impact on law enforcement requirements. Beef slaughter plant employees place increased demand on law enforcement authorities, but generally in proportion to population increases. Increases in crime have focused on property crimes and alcohol/drug addiction-related problems in communities impacted by slaughter plants, and these problems also have increased in communities not impacted by slaughter plants.

Impact of Cattle Feeding and Beef Slaughter Plants on Social Problems

Cattle feeding has little or no impact on community social problems. Minority populations linked to slaughter plants result in some dislike or distrust of the new residents by the established community residents. Ultimately, most people interviewed thought the increased diversity was a positive experience for the communities affected. Social welfare problems have not grown out of proportion to population increases.

Impact of Cattle Feeding and Beef Slaughter Plants on Housing Supply and Demand

Cattle feeding has little impact on employment growth and, hence, little impact on housing supply and demand. Cattle feeders often provide housing or mobile home hookups for employees. Slaughter plants result in substantial numbers of new residents within the impacted communities. The result is that housing shortages are apparent and often long standing. Communities have been slow to use government programs to add new housing, and local private developers have often been slow to respond to increased housing demand.

Stability of Work Force

Feedlot employees, often coming from within the communities, have little impact on the stability of the work force. In the case of slaughter plants, the impact is considerable. Many employees are recruited from outside of the community. In part because of the nature of slaughter plant work, the plants experience high and ongoing levels of employee turnover.

Overall Impact on Quality of Community Life

Cattle feeding has a modest, but positive, impact on the communities in which it occurs. Its presence has not materially slowed the transition adjustments that result from larger size farming and from community residents bypassing smaller towns in favor of patronizing businesses in larger centers. However, for some livestock related businesses such as feed dealers, veterinarians, and trucking firms, cattle feeding has a positive effect.

Perhaps more important, cattle feeding is necessary to support slaughter plants. Slaughter plants do have a substantial, and largely positive, impact on the economic life of a community. Most persons interviewed indicate slaughter plants have a positive impact on their communities. Slaughter plants are generally viewed as responsible community citizens. Business persons and political leaders are emphatic about the positive impact. Slaughter plants directly stimulate new employment and population growth and tend to stimulate other related business enterprises, such as trucking firms or cardboard box factories. For some persons in the community, however, the diversity of population, the pressures on housing, changes in schools, increase in social and law enforcement problems linked to population growth, and the occasional smell of slaughter plant lagoons are negative factors that outweigh the plant's positive impacts.

Slaughter plants are generally viewed as responsible community citizens.

X.

Alternative Strategies for Value-Added Cattle Production in the Northern Plains States

A range of strategies can be employed to enter value-added cattle production. These strategies vary in terms of capital investment required, in risk assumed, and in potential profitability. This section outlines a number of strategies and the attributes likely to be associated with each strategy.

Backgrounding Calves

This strategy envisions building feedlots to be used in backgrounding calves. Because backgrounding utilizes more roughage in a growing ration and need not be closely linked to feed-to-finish and slaughter plants, the location of backgrounding feedlots is less critical than for feed-to-finish. These feedlots could likely be located closer to concentrations of ranching activity, since their high energy feed requirements would be less than with a feed-to-finish feedlot operation. It would be important to obtain a number turns of cattle in the backgrounding feedlot to reduce the charge per head for fixed costs.

Backgrounded cattle could be sold to feedlots in Nebraska or elsewhere, perhaps to operators with whom the backgrounding feedlots have established preferred supplier relationships. Alternatively, ownership of backgrounded cattle could be retained by ranchers or the backgrounding feedlot with the cattle custom fed in a feed-to-finish feedlot.

Feeding to Finish

This strategy envisions building a number of relatively large-size feedlots, each around 20,000 head capacity, for feeding-to-finish cattle produced in the Northern Plains. Since feeding-to-finish requires a high energy ration, it would be important to locate such feedlots in areas of surplus corn and barley production. Surplus feed grains would enable feedlots to purchase feedstuffs locally, at no price

premium to local elevator prices. Reasonably close access to agricultural processing by-products could be an advantage in obtaining low-cost feedstuffs, as well.Since it is unlikely that feed-to-finish cattle could be profitably transported more than about 200 miles to a slaughter plant, it would likely be necessary to construct one or more slaughter plants located in the Northern Plains and West Lakes States. The number of feedlots constructed would likely be dictated in part by the requirements of the slaughter plants for fed cattle. Again, to reduce fixed cost charges per head of cattle fed, it would be necessary to keep feedlots in use on a year-round basis.

This alternative has a higher risk than backgrounding and requires a larger capital investment in feedlots and slaughter plants. Feeding cattle to finish has proven to be unprofitable for extended periods in other parts of the Great Plains where substantial feeding occurs.

A lower risk and lower cost alternative could involve custom feeding cattle in Nebraska or purchasing feedlots there to feed Northern Plains cattle. Existing feedlots can be purchased substantially cheaper in Nebraska and Kansas than their new construction cost would be in the Northern Plains and West Lakes States. Substantial excess capacity exists in cattle feeding facilities in the Middle West and the Great Plains States.

A range of strategies can be employed to enter value-added cattle production.

Purchasing Existing Feedlots and Slaughter Plants in Other States

Both feedlots and slaughter plants in other states, such as Nebraska, Kansas, and Colorado, potentially are for sale. If profitability from value-added cattle production is the primary objective of Northern Plains and West Lakes States cattle producers, that might be an attractive opportunity.

Existing facilities can usually be purchased at less than the cost of new construction. Age and obsolescence of facilities must be considered in any analysis of the relative merits of purchasing existing facilities versus building new facilities. If creating a value-added cattle industry in the Northern Plains and West Lakes States is the primary objective of cattle producers, this alternative may be unattractive.

Backgrounding in Owned Feedlots, Custom Feeding, and Custom Slaughter

This strategy retains a great deal of flexibility for Northern Plains and West Lakes States cattle producers. Backgrounding cattle in producer or cooperatively owned feedlots in these states promises attractive profits. Custom feeding in Nebraska feedlots, under a preferred supplier arrangement, minimizes the capital cost of constructing feedlots in the Northern Plains and West Lakes States. Custom slaughter at an existing slaughter plant, located close to where the cattle are fed to finish, offers cattle producers the opportunity to market a high quality branded product to supermarket chains. Cattle producers would, thus, retain the opportunity to move through the beef value chain all the way to the retail customer, while having to make only limited capital investment in fixed facilities. Additionally, the ownership of the cattle could change hands at a number of different points in the value chain, depending upon profitability and risk considerations.

XI.

Summary

The five-state study area has adequate feed supplies and feeder cattle to markedly increase cattle feeding. The feed costs in the Northern Plains States historically have been less than in the Southern Plains; however, higher transportation costs appear to offset that advantage. The recent and future increases in agricultural by-products will increase available feedstuffs across all states, except Montana.

The cattle feeding industry in the Great Plains and Middle West has a growing problem of overcapacity. To be successful, new feedlots in the Northern Plains would need to have cost efficiencies to offset their higher operating costs, compared to Nebraska and Southern Plains feedlots, or to produce for a niche market unaffected by the lower operating costs of established feedlots.

The population density in the five-state area decreases from east to west. Population density in the eastern regions of the five-state area could present a barrier to the establishment of large feedlots. All states have siting requirements for establishing feedlots. In addition, a number of states have local government regulations, more restrictive than either federal or state regulations.

Calving in the Northern Plains region is done in the spring. To provide a dependable year-round supply of calves, herd management techniques would need to be changed. Calves and feeder cattle would need to be available to the feedlot on a year-round basis.

The shortage of slaughter plants in the Northern Plains represents an economic burden to northern feeders. Transportation costs from Northern Plains States to slaughter plants in Nebraska amount to over $15 per head. Increases in profitable Northern Plains feeding-to-finish will depend upon lower transportation costs to slaughter plants; probably this will result from establishment of one or more new slaughter plants in the Northern Plains States.

There are substantial economies of scale in the cattle feeding industry. Capital costs vary from $468 per head for the 1,000 head feedlot to $243 per head for the 20,000 head feedlot. Even then, cattle feeders in Kansas and Nebraska assert they would need to add capacity at a cost of no more than $160 per head to be profitable. Projected labor costs vary from $52 per head for the 1,000 head feedlot to $23 per head for the 20,000 head feedlot.

Cattle feeding in the Northern Plains is profitable if both feed costs and cattle prices are favorable. If corn is in the $2 to $2.50 range, all three sizes of feedlots evaluated are generally profitable. If corn rises above $2.50, all three feedlots are unprofitable.

The backgrounding of calves appears to be more profitable than finishing cattle in the five-state area. Reasons for this include; fixed costs are spread over a larger number of cattle, feed costs are lower for growing calves, and transportation costs are less as a result of shipping 700 lb calves instead of 1,200 lb fed cattle.

A 20,000 head feedlot would provide $3.79 million in direct economic benefits for construction of the feedlot and $3.94 million in direct economic benefit annually for payroll, goods, and services. With a multiplier of three, total benefits to a community would be greater than $11 million annually. This measure of economic benefit to the local area from cattle feeding is limited to the feedlot payroll and to firms directly providing goods and services to the feedlot. In addition, profits from the feedlot operations have a direct impact that can be increased by a factor of three to reflect overall community impact from feedlot profits. This is true only if the profits accrue to investors within the community. If feedlot owners are from outside the community, it is conceivable that none of the profits would be spent or reinvested.

Cattle feeding does not employ a large number of workers. Hence, there is a limited impact on schools, housing, population, and law enforcement. One area where added costs for the community are involved would be in maintaining highways. A 20,000 head feedlot would add 25 semi-trailer trucks per day to local highways. The cost estimate for the added repair on secondary paved roads as a result of that feedlot is estimated at $6,400 per mile per year on roads affected by feedlot-generated traffic. These costs would be borne primarily by county and township landowners, who may receive no benefit from the feedlot operation.

Social and environmental costs can be largely addressed during the siting process. Quality of life aspects are protected by federal regulations and by state and local zoning boards. Increasingly, more stringent siting regulations and permit requirements are intended to protect communities from adverse

environmental and quality-of-life costs associated with feedlot operations. Distance from population, adequate water supplies, soil permeability, and feedlot drainage are some of the areas addressed. Environmental interests are protected by federal, state, and local regulations concerning surface and groundwater pollution, feedlot drainage, and waste storage and spreading. In addition, courts have begun to find in favor of plaintiffs who argue odor problems represent an actionable nuisance.

Communities with cattle feeding support that activity and, as long as prudent siting requirements are met, they support increased levels of cattle feeding. There are some complaints against established feedlots. These complaints are, however, infrequent and probably will grow less frequent as states and local governments move toward rigorous siting requirements and annual licensing for feedlots.

Opportunities for vertical networking appear to be more promising than those for horizontal networking. The needs for consistent quality and cost effectiveness, and management coordination required to achieve those, seem to weigh against horizontal networking. Conversely, vertical networking arrangements appear to fit these requirements well. Agricultural cooperatives may prove to be the preferred business structure in the Northern Plains around which to organize vertical networking arrangements.

Finally, a range of strategies can be pursued in developing value-added cattle production in the Northern Plains and Western Lakes States. These strategies embody differing levels of capital investment and involve different levels of risk.

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Appendix A.

A-Table 1. Net Returns for Various Size Feedlots with Various Corn Prices and Livestock Prices, Two Groups of Cattle, One Fed From 550 to 1200 lbs, One Fed From 700 to 1200 lbs

Fed Cattle	Corn Price $/bu				
Price $/cwt	4.00	3.50	3.00	2.50	2.00
100 Head Feedlot					
80	-207.84	-138.98	-69.37	-0.42	**68.53**
75	-229.13	-160.27	-90.67	-21.72	**47.23**
70	-250.49	-181.62	-112.02	-43.07	**25.88**
65	-271.78	-202.92	-133.31	-64.36	**4.59**
60	-293.2	-224.34	-154.74	-85.79	-16.84
250 Head Feedlot					
80	-189.68	-120.82	-51.21	**17.74**	**86.69**
75	-210.97	-142.11	-72.51	-3.56	**65.39**
70	-232.33	-163.46	-93.86	-24.91	**44.04**
65	-253.62	-184.76	-115.15	-46.20	**22.75**
60	-275.04	-206.18	-136.58	-67.63	**1.32**
1,000 Head Feedlot					
80	-190.90	-122.04	-52.44	**16.51**	**85.46**
75	-212.20	-143.34	-72.76	-3.81	**64.14**
70	-233.48	-164.62	-94.04	-25.10	**43.85**
65	-254.73	-185.86	-115.29	-46.34	**22.61**
60	-276.15	-210.29	-137.68	-68.73	**0.22**
5,000 Head Feedlot					
80	-139.63	-70.77	-1.16	**67.79**	**136.74**
75	-160.92	-92.06	-22.46	**46.49**	**115.44**
70	-182.22	-113.36	-43.76	**25.19**	**94.15**
65	-203.46	-134.60	-64.99	**3.96**	**72.91**
60	-224.88	-156.02	-86.42	-17.47	**51.48**
20,000 Head Feedlot					
80	-125.63	-56.77	**12.84**	**81.79**	**150.74**
75	-146.92	-78.06	-8.81	**60.14**	**129.09**
70	-168.23	-99.36	-30.11	**38.84**	**107.79**
65	-189.45	-120.59	-51.34	**17.61**	**86.56**
60	-210.87	-142.01	-72.41	-3.46	**65.49**
50,000 Head Feedlot					
80	-117.51	-48.65	**20.96**	**89.91**	**158.86**
75	-138.80	-69.94	-0.34	**68.61**	**137.56**
70	-160.15	-91.29	-21.69	**47.26**	**116.21**
65	-181.45	-112.59	-42.98	**25.97**	**94.92**
60	-202.87	-134.01	-64.41	**4.41**	**73.49**

100 Miles shipping into lot. 150 miles shipping to slaughter

Appendix B

COMMUNITY SURVEY RESULTS

Feedlot operators, community officials, and business persons were interviewed, as a part of this research project, to determine attitudes regarding the impact of cattle feeding on the economic and social well-being of communities in which cattle feeding occurred. The areas in which surveying was done were the Garden City, Kansas, area, the Platte River Valley of Nebraska, southern Iowa, southwestern Minnesota, and eastern South Dakota. The survey results are summarized by topic. A series of bullet points under each category reflects interviewee comments on the topic.

Cattle Acquisition

Northern Plains feedlot operators would likely gather cattle to feed primarily from the five states that are the focus of this study: Minnesota, Montana, North Dakota, South Dakota, and Wisconsin. Cattle could conceivably be drawn from the Canadian Prairie Provinces as well, although doing so would be somewhat cumbersome because of constraints on taking live cattle across the international border. Canadian feedlot operators may also feed more of their own cattle to finish because of the increased grain freight rates to Canadian West Coast ports of export and due to their expanded beef slaughter plant capacity coming on-line in south central Alberta.

Nebraska and Iowa cattle feeders will be strong competitors for Northern Plains calves and feeder cattle. These feedlot operators receive much of their feeder cattle from the Northern Plains. Feedlot operators in Kansas and Colorado will, to a lesser extent, be competitors for Northern Plains feeder cattle, as well. Feedlot operators are focusing on developing preferred supplier relationships with producers of reputation feeder cattle.

Feeding Strategies

Most feedlot operators prefer to purchase backgrounded calves for placement in their feedlots. However, an increasing number of operators are purchasing weaned calves and feeding them to slaughter. These operators prefer to retain some flexibility in stocking strategies for their feedlots and in the type of ration to be fed; for example, very high corn prices will increase the amount of alfalfa and silage being fed.

Feeding Ration

Feedlot operators believe ready access to locally produced corn is important to financial success of the feedlots. Irrigated corn and alfalfa have been important to the growth of cattle feeding in Kansas and Nebraska. In almost every instance, feedlots use on-site preparation of the feeding ration and employ independent nutritionist consultants to guide them in feeding ration selection.

Use of By-products

By-product use is particularly attractive to feedlot operators in the environment of high corn prices (summer 1996). Feedlot operators believe a stable source of by-products within less than 200 miles is necessary to profitably use by-products in the feeding ration. A wide array of agricultural processing by-products are utilized, including surplus and discarded food products; but, the choice of by-product use is determined by whether it is cost effective in achieving weight gains for cattle on feed.

Scale of Production

Feedlot operators report that feedlots of below 2,000 head capacity are unlikely to attain necessary threshold economies of scale. Most feedlot operators indicated optimal operating efficiency occurred at between 15,000 to 25,000 head capacity. Since success in cattle feeding requires careful attention to the details of feed use and livestock care, they believed replicating lots of that size range is more efficient than adding to the size of a given lot. Small-size feedlot operators continue to leave the business. Across the interview area, there are substantial numbers of abandoned small-size feedlots. Nonetheless, adequate feedlot capacity exists to feed each year's U.S. feeder calf crop to slaughter weight.

Cost of Feedlots

Feedlot operators interviewed indicate they could build new capacity for about $160 per head. In Kansas and Nebraska, feedlot operators indicated new fixed investment must be no more than $125 per head for the lot to be competitive. Engineering data indicate fixed investment in new feedlots would top $200 per head, perhaps raising doubts about how competitive these new facilities would be in an industry where most of the capacity is long established and investment costs have been largely recouped by investors. Alternatively, it is possible that Kansas and Nebraska feedlot operators are not fully accounting for all costs of new feedlot development. In Kansas and Nebraska, most investment in feedlots was owner equity built up over an extended period. Construction costs in Iowa, Minnesota, and South Dakota may prove higher because of the need to provide more shelter and relief from mud than is needed in Kansas or Nebraska.

Financing for Feedlot Operations

Most equity investment comes from within the community in Kansas and Nebraska. Most of the cattle on feed, however, are owned by persons other than the feedlot owners. Local lenders provide most financing for feedlot operators and for owners of custom fed cattle. Several feedlot operators interviewed suggest outside equity capital may become necessary in the future, as the scale of cattle feeding grows and new entrants start to take over ownership of existing feedlots.

Managing Production and Price Risk

Feedlot operators interviewed used relatively simple techniques to manage production and price risk. When profits are negative, they focus on custom feeding; when profits are positive, they own more of the cattle on feed in their feedlots. Only limited use is made of futures contracts, for either feed or feeder cattle on the input supply side or for fed cattle on the output side. Feedlot operators like to buy and sell cattle on the same market as a risk management tool. They also see opportunities for enhancing profitability through vertical networking, although they have found no advantage in horizontal networking.

Professional Services

Feedlot operators rely on veterinarian consultants to develop health care programs and to prescribe prescription drugs. Day-to-day animal care is handled by feedlot employees; veterinarian services would be too expensive. Every feedlot visited employed an independent nutritionist consultant to develop least cost rations to achieve weight gain targets. Feedlot operators are reluctant to rely on nutrition consultants employed by their feed suppliers. Feed is purchased by the feedlot on a delivered basis. Livestock trucking services are almost always provided by outside trucking firms.

Feedlot Labor Issues

Labor requirements in feedlots are one employee per 1,000 head of feedlot capacity. These workers are hired near to the feedlot and are paid from $22,000 to $40,000 per year, plus benefits that include health insurance and 401K plans. Worker turnover is infrequent. Substantial specialization of duties by employees is used to attain the desired efficiency in feedlot operations.

Marketing Strategies

Feedlot operators have difficulty attracting slaughter plant buyers with less than pen size lots of cattle offered for sale. Buyers prefer to deal with feedlot operators who can market several pens (at about 100 cattle per pen) each week year-round. Cattle are sold to the highest bidder without preference as to slaughter plant. Feedlot operators do not believe fed cattle can be profitably transported more than about 150 to 200 miles to a packer. Cattle feeders preferred to be located within one hour from slaughter plants.

Only a few of the larger feedlot operators interviewed indicated that they have considered and, in a few instances, achieved a preferred supplier status with a particular slaughter plant. Everyone worries about slaughter plant concentration, but at this point, no feedlot operators have opened alternative marketing channels that assure wider margins to the cattle producer, although some efforts at marketing a branded beef product to retail customers are being tried.

Coordination Efforts

Despite great interest in coordination across the livestock production and processing chain, no one has thus far created a clearly successful mode. Efforts at branded products, such as certified Angus Beef or Precision Beef in Iowa, have not demonstrated a higher return to producers on a regular basis, although consumers may be able to purchase beef with greater uniformity of quality as a result.

Feedlot operators are unhappy about slaughter plant consolidation, but have taken no decisive moves to change the resulting concentration or marketing system. Feedlot operators indicate the need for vertical coordination between cattlemen and feedlots with a focus on preferred supplier relationships and coordination of rancher breeding programs to produce animals that best meet feedlot operators' requirements. Feedlot operators dismiss the concept of horizontal networking among small-size feedlot operations as unworkable.

Pollution Control Issues

Pollution control requirements are becoming more demanding for feedlots. Small feedlots are often able to work with local officials on siting requirements; large lots must work with state officials as well as local officials. Expanding an existing feedlot appears to be easier to accomplish from a regulatory perspective than developing a new feedlot. However, most feedlots are regarded as doing a good job of pollution control. Special attention is focused on controlling surface water runoff and protecting the integrity of the aquifer. Plans for manure and liquid waste must meet federal and state/local requirements, and minimum distance requirements from neighbors must be observed. In both Kansas and Nebraska, licensing and regular inspections of feedlots will be required. Odor and dust complaints about feedlots were most often mentioned by neighbors.

Appendix C.

C-Table 1. Price Relationships Between Corn and Barley

Corn	Barley
- - - - - - $/bu - - - - - -	
2.00	1.59
2.50	1.85
3.00	2.11
3.50	2.37
4.00	2.63

$P_{bt} = 0.545 + 0.521 * P_{ct}$
(3.323) (4.202)

$R^2 = 0.638$

Where
P_{bt} is the price of barley in time t
P_{ct} is the price of corn in time t
number in parenthesis is t-statistic

C-Table 2. Price Relationships Between Fed Cattle, 700 lb Feeder Cattle and 550 lb Calves

Fed	Feeder	Calves
- - - - - - - - - - $ / cwt - - - - - - - - -		
60.00	66.05	65.49
65.00	72.54	73.84
70.00	79.04	82.20
75.00	85.54	90.55
80.00	92.04	98.91

$P_{ft} = -11.922 + 1.299 * P_{st}$
(2.041) (16.706)

$R^2 = 0.921$

$P_{ft} = -34.772 + 1.671 * P_{vt}$
(4.526) (11.793)

$R_2 = 0.880$

Where
P_{ft} is the price of Fed cattle in time t
P_{st} is the price of Feeder cattle in time t
P_{vt} is the price of calves in time t
number in parenthesis is t-statistic

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