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

Profitable livestock feeding could be a high value alternative to sustain the viability of family farms and rural communities in the Northern Plains and Western Lakes states (Minnesota, Montana, North Dakota, South Dakota, and Wisconsin). Issues to consider in evaluating the potential feasibility of livestock feeding include cattle and feed availability, feedlot size and cost, cost-effective feed rations, feedlot siting issues, alternative feeding strategies, and community impact.

Is Cattle Feeding Profitable?

Cattle feeding can be profitable but the level of profit is influenced by the cost of feed, the price of fed cattle, and size of the feedlot. Table 1 summarizes the net return to equity and risk (a measure of profit) for different feedlot sizes (1,000 head, 5,000 head, and 20,000 head) using three prices for corn and fed cattle. The profitability of smaller-sized newly constructed feedlots is not reported because the higher cost per head will result in a loss under likely feed and cattle prices. Likewise, the profitability of a 50,000 head feedlot is not reported because it is only slightly more profitable than a 20,000 head feedlot.

Where and How Many Cattle are Being Produced?

Deciding to operate a feedlot is more complex than an analysis of profitability would suggest. It also is necessary to evaluate the feeding capacity in the cattle industry, relative to the number of cattle to be fed and the trend in beef consumption.

The main concentration of calf production is in the Great Plains and the Mississippi and Ohio River Valleys (Table 2). From 1974 to 1994, the number of calves produced has fallen in most states; the number of calves born in the United States decreased 18% during that time (USDA). Between 1974 and 1994, each state in the study area lost calf production. Despite this decrease in production, more than 7 million calves were produced in the five states in 1994. There is an ample number of calves for backgrounding or feeding-to-finish within the five states.

Table 1. 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	--- $ profit/hd capacity ---		
75	-72.76	-3.81	**65.14**
70	-94.04	-25.10	**43.85**
65	-115.29	-46.34	**22.61**
5,000 Head Feedlot			
75	-22.46	**46.49**	**115.44**
70	-43.76	**25.19**	**94.15**
65	-64.99	**3.96**	**72.91**
20,000 Head Feedlot			
75	-8.81	**60.14**	**129.09**
70	-30.11	**38.84**	**107.79**
65	-51.34	**17.61**	**86.56**

Assumptions: feeder prices reflect fed cattle prices; owner equity is 50%; interest rate for term debt is 10% and 10.5% for the cattle; during one year a 550-lb feeder would be fed to 1,200 lbs and then replaced with a 700-lb feeder to be fed to 1,200 lbs; average daily weight gain of 3.47 lbs for growing and 3.59 lbs for finishing; death loss of 1.5%; 100 miles shipping into lot and 150 miles shipping to packing plant; 5% shrinkage;

7% return on equity has not been subtracted, this is $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.

By 1994, Nebraska, Kansas, and Texas fed most of the U.S. cattle. North Dakota and Wisconsin have increased cattle on feed during the past 20 years, while Montana, Minnesota, and South Dakota have decreased production. The decline in cattle feeding in the five states reflects 1) the relative price strength in cash grain markets during the early and latter parts of this period, 2) the lack of nearby packing plants to support cattle feeding in the five states, and 3) the expansion of cattle feeding in Nebraska, Kansas, and other Southern Plains

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and Rocky Mountain states. Despite the general decline in the number of cattle on feed during the past 20 years, production of carcass weight increased slightly as a result of more live weight per animal.

Table 2. 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
N. Dakota	1,305	1,010	49	70	217	***
S. 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	***
U.S. Total	54293	44643	13642	12789	36812	34197

***Data unavailable.

Kansas led the nation in the number of cattle slaughtered in 1994, followed by Nebraska, Texas, and Colorado. Most other states have reduced slaughtering during the past 20 years. The five-state area has reduced slaughter numbers by 28% from 1974 to 1994. The sharp decline in cattle slaughter in the five states reflects the combined impacts of growth in irrigated corn production, large-size feedlot development, and the consolidation/relocation of modern livestock packing plants in Nebraska, Kansas, and other Southern Plains and Rocky Mountain states.

The Cattle Cycle

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.

Oklahoma feeder steer prices tend to set price trends for feeder steers elsewhere in the nation. The prices for Oklahoma feeder steers and North Dakota calf prices bottomed out in 1975, peaked in 1979, declined until 1986, and peaked again 1991-92. Cattle prices have fallen since then. Historically, cattle prices follow about a ten-year cycle. The Food and Agriculture Policy Research Institute (FAPRI) estimates that prices will bottom out for the current cattle cycle in 1997 (Table 3).

Table 3. 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.

Northern Plains cattle prices, including calf and feeder cattle prices, can be expected to follow national market patterns and price movements. By 1998, the stage will be set for stronger prices for all levels of the cattle industry.

U.S. Meat Consumption

Total U.S. meat consumption has increased from 227 lbs/capita 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 by 19.4% whereas pork consumption has increased 18.5%. Poultry consumption has increased 101.5% during the same time period. Overall, the cattle industry has been experiencing an ongoing secular decline in domestic consumption as a result of higher relative cost, greater variety in pork and poultry products, and health concerns about red meat. However, U.S. beef exports increased 655% from 1978 to 1995.

A Need to be Competitive

Beef cattle numbers in the United States continue to be in a long-term decline, and further reductions in the U.S. cow herd would suggest even greater excess capacity in the nation's feedlots. Hence, to successfully add new capacity in the cattle feeding industry, it is necessary to displace some of the existing feedlot

capacity in other regions of the country. To do so, production from new feedlots must be more cost effective than existing feedlots, or it must serve a niche market.

Is Feed Available?

Available feedstuffs reasonably close to the feedlot is a primary consideration in determining whether a region will be competitive in cattle feeding. Cattle feeding is more likely to be profitable where feedstuffs are in excess supply, thereby enabling cattle feeders to buy feed grains delivered to their feedlots at little or no premium over the price offered by local grain elevators. In addition, it has been the experience of cattle feeders that it is more profitable to transport feeder cattle to the feed supplies than it is to move feed supplies to the cattle.

The five-state area has increased feed grain production 72% from 1975 (880 million bu) to 1995 (1,520.6 million bu). 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.

Some difference of opinion exists as to whether cattle finished on barley will sell as favorably as cattle finished on a corn ration. Cattle feeders in Kansas, Nebraska, and Iowa believed packing plants prefer the yellow marbling, resulting from feeding corn, rather than the white marbling associated with barley-fed cattle. Researchers at the Carrington Research Center suggested this issue is more individual preference than one of better feedlot performance. Barley is a primary feedstuffs in the Pacific Northwest and Western Canada with no apparent price penalty for the cattle.

Table 4 shows the historical price difference between corn in the southern states and North Dakota. 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. The lower cost of feed grains in the Northern Plains is an important advantage for cattle feeding in the region. With a corn-barley ration, 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.

Table 4. Price Differential for Corn Among Kansas, Nebraska, and North Dakota, Price Received by Farmers

	Market Price			Difference Between North Dakota and	
	KS	NE	ND	Kansas	Nebraska
	----------dollars/bushels----------				
1986	1.60	1.52	1.42	0.18	0.10
1990	2.30	2.30	2.15	0.15	0.15
1995	3.25	3.15	2.80	0.45	0.35
10-Year Average	2.57	2.50	2.33	0.24	0.17

Source: USDA.

By-Products as Feedstuffs

Increased valued-added agricultural processing in the five-state area is expanding the availability of by-products as a feedstuffs. Cattle feeders are willing to use by-products in their feeding rations if it lowers their costs and they are able to secure an adequate supply for the entire feeding period. Cattle feeders are reluctant to change feedstuffs in the ration once cattle are on feed.

Availability of by-products does not necessarily create a more favorable environment for cattle feeding. By-products are priced according to the source grain and the feed value remaining after processing; they are not available at distressed prices.

Adequate supplies of feed grains, principally corn and barley, along with growing amounts of agricultural processing by-products in the five-state area are available to support increased 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, based on the availability of feedstuffs.

Growing and Finishing Rations

Table 5 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. Corn gluten contains about 20% crude protein, more than twice that of corn, and about 92% the energy of corn. Corn gluten can be fed either dry (90% dry matter) or wet (55% dry matter).

Table 5. Growing and Finishing Rations for 550-lb Calves to Finish With Various Formulations, Dry Matter Basis

Feed Item	Growing	Finishing
	Dry Matter 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 (lbs)	3.47	3.54

Would Northern Plains Climate Affect the Rate of Gain?

Research conducted at the Carrington Research Center indicates that it is possible to attain rates of gain and feed efficiency comparable to those experienced in other regions. The cold of northern winters can be offset by the heat of southern summers. However, careful management is necessary to attain these efficiencies. Most North Dakota cattle feeders have not yet achieved the rates of gain reported at Carrington.

What Facilities and Equipment are Needed to Feed Cattle?

Table 6 summarizes the capital costs for the development of the three feedlot sizes. The cost estimates assume the feedlots would be new facilities ready to use. Items included in each of the categories are as follows:

Lot equipment and land improvements — waterers, lights, gates, scale, wells, windbreak, corrals, bunks, lagoon, ditches, and cement.

Buildings — areas for office, maintenance, feed handling, cattle processing, hospital, as well as grain storage and handling.

Feedlot equipment — feed mill or grinder, trucks, tractors, loaders, and associated items.

The feedlots are designed with pen sizes in multiples of 60 head per pen and 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. 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 mounds in the pens so cattle are assured of a dry place and are able 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 windbreaks should suffice in Montana, North Dakota, and the drier areas of South Dakota.

Table 6. Capital Cost Summary for Various Feedlots

One Time Capacity	Lot Equipment and Land Improvements	Buildings	Machinery	Total Cost	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

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 four buildings: 1) office, 2) feed handling, 3) cattle processing, and 4) hospital. Grain storage is designed for a 21-day supply.

Machinery and equipment costs are projected based on the common practices for equipping feedlots of the selected sizes. Smaller lots use a mixer/grinder to prepare the ration, whereas the 20,000 head lot uses a stationary feed mill.

Farmers who choose to use existing facilities for feeding and utilize existing equipment will clearly reduce the initial capital cost. However, achieving the high rates of gain used to estimate profit requires high quality facilities and outstanding management. If efforts to reduce capital investment reduce feedlot performance, it is unlikely the operation will achieve the profitability targets. But, it is conceivable that farmers feeding cattle in relatively small feedlots could achieve acceptable rates of gain.

Many feedlot operators in Kansas and Nebraska are planning expansions in cattle feeding capacity. At the same time, some farm-size feedlots stand empty, having been abandoned as unprofitable, especially in southern Iowa. Cattle feeders in Kansas and Nebraska indicated they could add feedlot capacity for about $160 per head. Some feeders indicated that new fixed investment would need to be no more than $125 per head to remain 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 recovered. Thus, the fixed cost of feeding cattle in those feedlots will be significantly less than in a newly constructed feedlot in the Northern Plains.

Is Feeding a Year-Round Activity?

Another question is what would be the profitability of operating a feedlot at less than full capacity? Table 7 summarizes the return for a feedlot operated at 80% of capacity. As expected, the level of profit is less than if the facility is operated at capacity.

In order to operate a feedlot near capacity throughout the year, a supply of feeders must be available. Currently, most calves are born in the Northern Plains during late winter and early spring. Will cattle producers need to adjust calving schedules to assure 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? Will these calves and feeder cattle be available to cattle feeders at competitive prices? These and similar unanswered questions will need to be studied as decisions are made about cattle feeding.

Table 7. 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	--- $ profit/hd capacity ---		
75	-109.50	-29.60	**43.00**
70	-130.70	-50.89	**21.71**
65	-152.00	-72.13	**0.47**
5,000 Head Feedlot			
75	-58.23	**21.67**	**94.27**
70	-79.53	**0.37**	**72.98**
65	-100.70	-20.86	**51.74**
20,000 Head Feedlot			
75	-27.31	**35.67**	**108.27**
70	-65.53	**14.37**	**86.97**
65	-86.76	-6.86	**65.74**

Assumptions: same as for Table 1 except the feedlot is operated at only 80% of capacity.

Can Producers Team Up with Neighbors?

Another frequently asked question is whether farmers can improve their efficiency by working together (networking) and thereby compete with larger size operations. Such collaborative ventures help individual businesses expand or improve markets, increase value or productivity, and stimulate learning. Networks can be 1) vertical networks where firms produce different stages of the same final product; 2) horizontal networks where firms produce the same products and collaborate in purchasing supplies or marketing production, and 3) knowledge networks where firms 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.

A non-profit corporation in Iowa provides cooperating farmers detailed feeding performance and carcass data on their fed cattle. The primary objective is to help farmers improve the genetics and management of their cattle herds to enhance feed efficiency and to meet packing plant grade and yield requirements. This corporation also custom slaughters a limited number of fed cattle to supply a small supermarket chain, where the beef is sold under the supermarket's brand name. However, at this time, there is no evidence that farmers are receiving higher prices

for their fed cattle as a result of the retail marketing program.

Another group of Iowa producers is exploring the feasibility of developing and operating a 5,000 head cooperatively owned feedlot. Projected construction costs may limit the profitability, or even the feasibility, of the operation, however.

Still another strategy being explored in Iowa is marketing organic beef. The plan is to market this beef into a narrow niche market, through a growers' cooperative. However, there is no plan at this time to create a branded product that would develop brand equity for the cooperative products.

Another example involves 17 Minnesota feedlots that provide fed cattle to a nearby processing plant which slaughters exclusively for an East Coast chain of 27 food stores, where the meat is sold as a branded product. Feedlots not able to meet the quality standards set by the group may be denied access to the packing plant. Some cattle feeders believe this example of vertical coordination represents a viable and necessary strategy for the cattle industry. Vertical coordination is, however, controversial with many feedlot operators who object to the perceived market power of large packing companies.

No situations were found where independent farm-size cattle production and feeding with joint marketing of fed cattle led to premium prices paid by packing plants. Feedlot operators explained that it was unlikely horizontal networking would be successful, because of the careful coordination and management needed for cattle feeding.

Nor was there evidence that packing plants respond with higher prices to one-time offers of large blocks of fed cattle. Instead, packing plant buyers are primarily interested in visiting and buying from feedlots that can offer more than one pen of fed cattle for sale each week.

Farmer cooperatives may be the preferred business organization to accomplish vertical networking, for several 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.

Would Financing be Available?

Constructing and operating a feedlot requires a substantial cash investment (see Table 6). Some of the capital will be provided by feedlot owners which may be individuals, partnerships, limited liability companies, corporations, cooperatives, as well as vertically integrated packing and meat processing businesses. The remainder of the capital is expected to be provided by lenders such as commercial banks, the Farm Credit System, and Banks for Cooperatives.

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.

Lenders are willing to provide *operating capital* 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.

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

Feedlot operators and lenders revealed 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, about 70% of the cattle fed in southwest Kansas are reportedly owned by investors from outside the region.

What Labor is Needed?

Skilled workers are indispensable because successful feedlot operation requires careful attention to every detail and outstanding management of the entire operation. A frequent observation is that management of the feedlot not only impacts operating costs but also

the quality of the finished cattle. It would seem prudent to hire a manager with extensive and successful experience in operating a large feedlot.

Tasks that need to be performed in operating a feedlot include

management — planning and overseeing the entire operation; conducting business with creditors, customers, and owners; buying and selling cattle, feed, and other inputs; oversight of personnel.

managing the day-to-day operation — maintaining inventories; managing the cattle; maintaining facilities; developing rations.

secretary/accountant — maintaining personnel information and payroll; fulfilling receptionist, secretarial, and accounting duties.

cattle handling — processing cattle upon arrival; checking the cattle daily; treating sick cattle; and cleaning the pens.

feeding — operating and maintaining the feed mill; delivering feed to bunks; maintain records of feeds received and fed.

maintenance — maintaining facilities and equipment.

Labor costs are a substantial portion of the costs associated with cattle feeding. Table 8 shows the labor requirements and costs for various sizes of feedlots (based on experiences in Kansas and Nebraska). The salaries listed include fringe benefits and incentive pay for performance. Larger lots have an advantage over smaller lots because of increased mechanization, efficiency, and worker specialization. A general rule is that one full-time worker is needed for each 1,000 head of feedlot capacity.

Feedlot operators indicated that most feedlot workers, except for the manager and the assistant manager, were hired from within the broader community and stayed in their jobs for several years. Workers received benefits that include health insurance and 401K plans. Not infrequently, the employment arrangement included use of a house or mobile home hookups on the farm and, occasionally, the use of a pickup truck.

Table 8. Labor Requirements for the 1,000, 5,000, and 20,000 Head Feedlots

	Number of Head					
Position	1,000		5,000		20,000	
	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
Number of workers	2		6		21	
Total Payroll ($)		52,000		173,000		491,000
Labor Cost / Head ($)		52.00		28.83		23.38

Where Would the Fed Cattle be Sold?

Fed cattle are generally sold to a packing plant, which often buy cattle just once each week. Buyers bid on cattle during a time frame as narrow as two hours of one day. Miss the time frame, and the feedlot must wait until the next week to sell cattle.

Typically, cattle are trucked from feedlots directly to packing plants and are slaughtered within hours of their arrival. 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. Table 9 shows the return to equity and risk of shipping the fed cattle 340 miles to a packing plant, rather than 150 miles as assumed in Table 1. Some might suggest that the animals be kept at the packing plant for a 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. Limiting the distance fed cattle are transported to the packing plants appears to be the standard practice used to limit the shrinkage experienced by the cattle.

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 lost to the cost of transporting fed cattle to the packing plants. However, if packing plants were located sufficiently close to the feedlots, the price advantage for feed grains enjoyed by the Northern Plains region would continue. But the question of whether there would be an adequate year-round supply of feeder and fed cattle becomes an important issue, however.

Table 9. Net Return Per Head Capacity to Equity and Risk for Various Feedlots, Two Groups of Cattle Fed Per Year Shipped 340 miles to a Packing Plant

Cattle price	Corn price $/bu		
$/cwt	3.00	2.50	2.00
1,000 Head Feedlot	---- $ profit/hd capacity ----		
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			
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			
75	-31.05	**37.90**	**106.85**
70	-52.35	**16.60**	**85.55**
65	-73.58	-4.63	**64.32**

Assumptions: same as for Table 1 except the distance to the packing plant is 340 miles.

Are There Environmental Rules for Feedlots?

Feedlot siting requires compliance with federal, state, and, increasingly, local environmental laws and operating permits. While federal law sets the overall dimensions for the requirements, state and local governments often impose more stringent requirements. A consequence of increased local government regulation is that environmental requirements differ substantially among jurisdictions within a state, and local boards not infrequently take the "not in my back yard" approach to feedlot siting and expansion. Another frequent observation is that it is easier to obtain permits to expand an existing feedlot than to site a new facility. A number of states also have begun to inspect and re-license feedlots annually.

A key component of these siting requirements is the control of runoff from feedlots.

* Cattle feedlots with a one-time capacity of 1,000 head or more are required by federal law to have a lagoon to retain runoff from the feedlot, manure storage areas, feed processing, and feed alleys.

* The feedlot and manure storage areas must be protected from surface running water during a storm event.

Local ordinances address a broad range of environmental issues. For example, one local ordinance specifies setbacks from ditches, water wells, sinkholes, residential dwellings, and public roads when disposing of manure by spreading on farm land. Where the manure is spread without incorporation, the required distance from surface waters is governed by soil texture, slope, and whether the ground is frozen. In addition, access contracts must be in place for land to spread the expected manure. One acre of land is required for every two head of feedlot capacity (two animal units per acre).

Federal law does not consider airborne particles discharged from a feedlot to be pollution. However, courts have ruled that odor can be a nuisance. Some state and local governments control odors with siting regulations that specify the location of a feedlot by reference to human population. Future population development should be projected before siting a feedlot to minimize problems.

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 are not "farms" protected by such statutes.

Several methods are available to minimize dust and odor releases from a feedlot. Dust can be controlled with proper feedlot maintenance, such as routine cleaning of pens and feed processing areas, proper storage of dry manure, and well-designed windbreaks surrounding the feedlot. Odors can be controlled with proper management at each step in the manure-handling system.

What Impact Would Feeding Have on the Community?

The impacts of developing and operating a feedlot are not limited to the feedlot operator and the livestock owners. In addition, there are questions about the impact cattle feeding would have on local grain and cattle prices, the local economy, and the community.

Only a qualitative answer is possible to the question of whether expanded cattle feeding will strengthen the local feed grain market. Given the general level of feed grain production in the Northern Plains, 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 production.

A similar response also answers the question of what impact cattle feeding would have on the price of calves and feeder cattle. Table 10 outlines projected break-even prices for feeder cattle and calves for the three feedlot sizes and several corn and fed cattle prices. These are the maximum prices that could be paid for feeder cattle or calves by feedlot operators and still fully cover all fixed and variable costs of the feeding operation. At these prices, the feedlot operation earns **no profit**. This is the maximum impact feeding could have on calf and feeder cattle prices, and it is not substantial.

A third question is what are the economic impacts of cattle feeding for the community. Constructing the feedlot will require labor, material and supplies, and building and equipment. Table 11 shows the direct economic impact of the construction of a 20,000 head feedlot. About 82% of the total construction cost is expected to be spent locally.

Table 10. 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	2.79	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	88.31	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

Using an economic multiplier of three, the benefits for the community of the feedlot construction are $11.37 million, and the annual ongoing economic benefits for the community are $11.82 million. Cattle feeding does not have a large impact on community businesses, although certain livestock-related service businesses (feed dealers, veterinarians, and trucking firms) do benefit.

Table 11. Local Direct Economic Impact of a 20,000 Head Feedlot

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

Additional truck traffic on local roads can increase costs to the local community. The added maintenance on county or township roads as a result of more 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 12 shows the impact of the additional truck traffic for a 20,000 head feedlot.

Table 12. 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]Equivalency Single Axle Load.

Another question to consider is the impact cattle feeding has on the population and other social considerations for the community. Cattle feeding causes little change in either the community work force or population. It has little impact on community demographics and has not stopped population out-migration nor the trend to larger farm operations. Consequently, cattle feeding has little impact on school population, law enforcement requirements, community social problems, employment growth, and demand for housing. Feedlot employees, often come from within the communities, and have little impact on the stability of the work force.

Community leaders interviewed in Kansas, Nebraska, Iowa, Minnesota, and South Dakota 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 existing 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.

Secondary Impact of Cattle Feeding

Packing plants are needed to enhance the profitability of cattle feeding. But unlike feedlots, packing plants can have a substantial impact on the community.

A large work force is needed to operate a modern packing facility. Employees are often recruited from outside the community. In part because of the nature of packing plant work, the plants experience high levels of employee turnover, sometimes more than 100% per year. People moving into the community to work in the packing plant often are relatively young and are likely to have 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.

Beef packing 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, but these problems also have increased in communities not impacted by packing plants.

Minority populations linked to packing plants result in some dislike or distrust of the new residents by the established community residents. But social welfare problems have not grown out of proportion to population increases.

Substantial numbers of new residents can lead to housing shortages. Some communities with packing plants have been slow to use government programs to add new housing, and private developers also have been slow to respond to increased housing demand. Hence, housing availability and cost are continuing problems for communities with rapid employment growth.

Packing plants are generally viewed as responsible community citizens and have a positive economic impact. Packing 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 packing plant lagoons are negative factors that outweigh the plant's positive impacts.

What are the Alternatives?

* Build feedlots for *backgrounding calves.* Because backgrounding uses more roughage and need not be closely linked to feed-to-finish and packing plants, the location of backgrounding feedlots is less restrictive than for feed-to-finish feedlots. Backgrounding feedlots could be located closer to

concentrations of ranching activity. It would be important to obtain a number turns of cattle in the backgrounding feedlot to reduce the charge per head for fixed costs. Again, the question of a year-round supply of cattle arises. Table 13 shows the return to equity and risk of backgrounding calves.

Table 13. Net Return Per Head Capacity to Equity and Risk for Backgrounding Calves in 1,000 Head Feedlot, Seven Groups of Cattle Fed Per Year

Cattle price	Corn price $/bu		
$/cwt	3.00	2.50	2.00
1,000 Head Feedlot	--- $ profit/hd capacity ---		
75	**35.57**	**82.94**	**130.32**
70	**40.58**	**87.95**	**135.33**
65	**45.98**	**93.35**	**140.72**

450 miles shipping to feedlot, full capacity.

Backgrounded cattle could be sold to feedlots in other regions, such as Nebraska, 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 in another region.

* *Purchase Existing Feedlots and Packing Plants in Other States* — Purchase feedlots in cattle feeding regions to finish 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. Similarly, packing plants in other states potentially are for sale. Age and obsolescence of facilities must be considered in analyzing the relative merits of purchasing existing facilities.

  If profitability from value-added cattle production is the primary objective of Northern Plains cattle producers, purchasing existing facilities in areas with establishing feeding/beef packing might be an attractive opportunity. If creating a value-added cattle industry in the Northern Plains is the primary objective, that alternative may be unattractive.

* *Backgrounding in Owned Feedlots, Custom Feeding, and Custom Slaughter* — A lower risk and lower cost alternative could involve custom feeding in cattle feeding regions. This strategy retains a great deal of flexibility for Northern Plains cattle producers. Backgrounding cattle in producer or cooperatively owned feedlots promises attractive profits, coupled with custom feeding in existing feedlots, under a preferred supplier arrangement, to minimize the capital cost of constructing feedlots and packing plants in the Northern Plains. Custom slaughter at an existing 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. 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.

Conclusion

Cattle feeding can be profitable in the Northern Plains. There are plenty of cattle and feed available. The feedlot should be sited near feed sources, and there are substantial economies of size. Environmental issues arising from feedlots can be controlled through prudent siting and daily management of the feedlot. The economic impact of cattle feeding on the surrounding community is modest, but not insignificant. Backgrounding calves will likely provide more consistent profits than feeding cattle to slaughter weight.

Extensive development of cattle feeding in the Northern Plains would require building packing plants to reduce the cost of transporting fed cattle. Such a strategy raises a question of whether there will be cattle available to support the year-round activities of feeding and slaughter. Packing plants also have a more substantial impact on the community.