MICHIGAN STATE UNIVERSITY

PRODUCT CENTER
BUSINESS INNOVATION IN AGRICULTURE, FOOD AND NATURAL RESOURCES

THE STRATEGIC MARKETING INSTITUTE
WORKING PAPER

A Feasibility Assessment of a Meat Slaughtering/Processing Plant or Feedlot in Northern Michigan

William A. Knudson and H. Christopher Peterson
January 2007

80 AGRICULTURE HALL, MICHIGAN STATE UNIVERSITY, EAST LANSING, MI

MICHIGAN AGRICULTURAL EXPERIMENT STATION

Table of Contents

Executive Summary

Rationale

This report is a result of several forces affecting Michigan's livestock community. The existence of Bovine TB in the Northeastern Lower Peninsula has affected market access for beef producers. There is also increased interest in developing meat products that meet the needs of specialized groups of consumers. Examples of this include growing ethnic markets and markets for food products that promote health. These markets also create the possibility of higher prices for producers and others in the industry.

This study analyzes the feasibility of a small meat processing plant in the Northern Lower Peninsula as well as the feasibility of a feedlot in the same area. Funding for the study was provided by the Michigan Department of Agriculture as well as the Michigan Agricultural Experiment Station through the Michigan State University Product Center for Agriculture and Natural Resources. Information was gathered from a wide range of published sources as well as discussions from those familiar with the beef, lamb and goat industries.

This feasibility assessment will focus on the following considerations: economic feasibility, market feasibility, technical feasibility, financial feasibility, and management feasibility. In so doing, this study follows the format used by the USDA Rural Development, and could be used by firms interested in grants and loan guarantees. Economic feasibility focuses on access to labor, transportation and other infrastructure issues. Also considered will be the number of animals in the area, and whether or not there are sufficient numbers of animals to support a processing facility or a feedlot. Market feasibility will focus primarily on consumer tastes and preferences and what products could be developed to meet those preferences as well as the level of competition in the market. Also, the level of commitment of producers and buyers of meat products will be assessed.

Technical feasibility focuses on the engineering of a processing plant and a feedlot as well as environmental and regulatory issues. Traditionally, Michigan has not been as open to large scale livestock operations as other states, environmental and regulatory issues will be particularly important to determine the technical feasibility of either a processing plant or a feedlot. Financial feasibility will focus on the capital requirements necessary for a processing facility or a feedlot, as well as cash flow issues. Management feasibility will focus on the organization structure of a processing facility or a feedlot as well as the qualifications and skill set needed by the management. Additionally, the type of business structure that would successfully carry out the activities of the processing plant or feedlot will be considered.

Given the number of cattle relative to other species of animals in the area, most of the emphasis of this study is on beef. However, there is also some discussion of lamb and goats as well. This is primarily due to the fact that there are some definite market

opportunities for firms in the lamb and goat industry as well as interest in expanding lamb and goat production in Northern Michigan.

Findings and Recommendations

Processing Plant: Briefly stated, a processing plant is not feasible. The fundamental reason it is not feasible is the lack of animals in the area. In some respects, this part of the state is caught in a Catch 22: There are not sufficient numbers of animals to support a processing plant and producers may not be willing to expand livestock production unless there is access to a processor. A small processing plant that processed 420 carcasses a day would slaughter every head of beef cattle in Northern Michigan in a year. The seasonality of livestock production compounds this shortcoming. A processing facility does not appear to be feasible from an economic or technical point of view. Given the economies of scale in meat processing, the few number of animals in Northern Michigan, and the degree of excess capacity in the industry, a processing plant is not technically feasible. Given the financial situation of producers and others in the industry, a processing plant does not appear to be feasible from a financial point of view either. Loan guarantees, grants, and other means of financial aid would be necessary for a processing plant to be financially feasible. Therefore, internal resources are not likely to be sufficient for a processing plant to be financially feasible.

From a marketing perspective a processing plant that focuses on sheep or goats is feasible. This is primarily due to the large and growing Muslim population in Michigan. While locating a plant in the Detroit Metropolitan area would be closest to consumers, Northern Michigan is still well within the range to service this market effectively. However, in order to gain access to this market, the animals must be slaughtered and processed in accordance to Islamic regulations. Also, the plant needs a steady year round supply of animals with the potential to increase production during Ramadan. Without access to more animals this market potential will not be achieved.

A beef processing plant is probably not feasible from a marketing perspective. This is due to two primary reasons. The first is the level of excess capacity of beef production in the state. Adding additional capacity is not likely to be efficient. Another major drawback to a beef processing facility is the difficulty of finding a market for the entire carcass. Finding a market for steaks and ground beef is relatively easy, finding a market for roasts and other cuts is difficult, and finding a market for organs, hides and other beef products is extremely difficult. The smaller the processing plant the greater these challenges become.

From a management perspective a processing plant is feasible. The size of the facilities considered and the amount of labor used are not excessive. An ownership structure of a cooperative, a Limited Liability Company (LLC) or other corporate structure is the most feasible. An ownership structure of one entrepreneur is less likely to be successful. This is due to the financial constraints faced by an individual entrepreneur as well as the management stress that an individual entrepreneur might face. Some type of corporate

structure is recommended. A cooperative or LLC would enhance the management and financial feasibility of a processing plant.

Feedlot: A feedlot is feasible from an economic, marketing, financial, technical and managerial perspective, provided the regulatory environment is not too restrictive. However, a feedlot located in Northern Michigan is not recommended. The primary reason it is not recommended is that the feed costs of locating a facility in that part of the state is too high relative to feed costs in other parts of the state. The growth of the ethanol industry will only make this cost disadvantage worse. Another issue facing a feedlot in this part of the state is proper manure management. If the feedlot determines that land application is the preferred method of manure management finding a sufficient land area to spread the manure may be difficult. Much of the land in Northern Michigan is owned by the state and is not available for land application of manure.

One way to minimize costs and also provide a benefit to an ethanol plant is to locate a feedlot near an ethanol plant or enter into an agreement with an ethanol plant for the use of wet distiller's grains solubles (WDGS). This would provide a good feed source to the feedlot while reducing the operating costs of the ethanol plant. This would require the feedlot to be located in the middle or southern part of the state. Locating in this part of the state also has the benefit of being closer to larger processing firms. Ownership of the feedlot could remain with a firm or cooperative located in Northern Michigan.

There are several possible marketing strategies that could be successful. One strategy that perhaps shows the most promise is to enter into an agreement with a processor and marketer of specialty beef products. This would allow the owners of the feedlot to obtain a higher price for their animals without having to take on additional marketing activities. However, the owners of the feedlot would have to meet the production standards of the processor. Retained ownership through an agreement with an existing processor also holds some promise but also increases the risk. Marketing the entire carcass may also be an issue although less of an issue than operating a processing plant.

Given the rising costs of feed and the level of competition, a feedlot that focuses on the commodity market will face difficulties. The fact that all cattle from this part of the state are required to have additional identification as a result of the TB situation in the state can also be used by producers to obtain a higher price provided producers raise cattle that have additional quality characteristics. While feasible, a commodity market feedlot is not recommended.

Another option is direct sales of the animals which would require the consumer or the feedlot working with the consumer to arrange the slaughter and processing of the animal. This has potential for a small number of animals, but is not likely to be a strategy that a large number of producers will be able to utilize. Nonetheless, this has potential for an entrepreneur that has a steady supply of consumers and some access to a processor, or butcher.

Provided the regulatory environment is not too restrictive and a good manure management program can be implemented at a reasonable cost, a feedlot is technically feasible. Given the strong collateral of the cattle in a feedlot, the feedlot is also likely to be financially feasible, especially if the feedlot owner is a cooperative or LLC. Having an established buyer of the cattle through a contract or other means would further strengthen the financial feasibility of the feedlot. There is sufficient managerial capacity for a feedlot to be feasible as well. In conclusion, a feedlot that forms a strategic alliance with another with a processor or marketer in the beef industry has a good chance of being successful.

A Feasibility Assessment of a Meat Slaughtering/Processing Plant or Feedlot in Northern Michigan

Introduction

This study is a result of several forces affecting Michigan's livestock community. The existence of Bovine TB in the Northeastern Lower Peninsula has affected market access for beef producers. There is also increasing interest in developing meat products for specialized markets. Products that meet the needs of a particular group of consumers may be able to command a higher price. The higher the price the greater the ability to offset the higher cost structure of smaller processing plants.

Also considered is the potential for a beef feedlot in Northern Michigan. The state, especially the Northern counties, has traditionally been dominated by cow calf operations. The existence of Bovine TB and the changing feed situation in the state driven by the increased number of ethanol plants and the feed byproducts they produce may have improved the environment for a feedlot or terminal facility in the state.

In response to these issues facing the state's meat industry, the Michigan Department of Agriculture in conjunction with the Michigan Agricultural Experiment Station provided funding to the Michigan State University Product Center for Agriculture and Natural Resources to undertake a feasibility assessment to determine the potential for a meat slaughtering and processing plant or a feedlot in Northern Michigan. The study will consider slaughter plants, facilities that kill, gut and provide minimal processing of meat animals as well as processing plants, facilities that divide the carcass into consumer ready cuts of meat. A feedlot is a facility that gathers animals, primarily beef, in order to increase the concentration of their daily feeding in order to increase their feed intake and weight gain until they reach market weight. Feeding animals until they reach market weight and shipping them directly to a slaughter facility can reduce the amount of paperwork and other regulations in the part of the state most affected by Bovine TB.

This feasibility assessment will focus on the following considerations: economic feasibility, market feasibility, technical feasibility, financial feasibility, and management feasibility. In so doing, this study follows the format used by the USDA Rural Development, and could be used by firms interested in grants and loan guarantees. Economic feasibility focuses on access to labor, transportation and other infrastructure issues. Also considered will be the number of animals in the area, and whether or not there are sufficient numbers to support a processing facility or a feedlot. Market feasibility will focus primarily on consumer tastes and preferences and what products could be developed to meet those preferences as well as the level of competition in the market. Also, the level of commitment of producers and buyers of meat products will be assessed.

Technical feasibility will focus on the engineering of a processing plant and a feedlot as well as environmental and regulatory issues. Traditionally, Michigan has not been as open to large scale livestock operations as other states, environmental and regulatory

issues will be particularly important to determine the technical feasibility of either a processing plant or a feedlot. Financial feasibility will focus on the capital requirements necessary for a processing facility or a feedlot, as well as cash flow issues. Management feasibility will focus on the organization structure of a processing facility or a feedlot as well as the qualifications and skill set needed by the management. Additionally, the type of business structure that would successfully carry out the activities of the processing plant or feedlot will be considered.

This study will focus on beef, which is a major livestock activity in Northern Michigan. However, other species will be considered as well. Given the uniqueness of processing and farming, poultry products will not be considered. Pork production will not be considered because of the few number of hogs in Northern Michigan. Some efficiencies could be captured through a multispecies processing plant. Information for this study came from an analysis of published resources as well as interviews with experts in the industry. For the purposes of this study Northern Michigan will include those counties north of the Saginaw Bay and East of Marquette County.

Overview of the Red Meat Industry

Beef

In 2004, retail sales of red meat (beef, hogs, and lamb) were estimated to be $44.5 billion (Mintel, p.1) in the U.S. Adjusted for inflation, retail red meat sales increased by 23 percent from 1999 to 2004 (Mintel, p.15). It is also estimated that red meat sales will increase by 43 percent from 2004 to 2009 (Mintel, p.74), well above the expected rate of inflation. Beef is the dominant red meat category representing 72.5 percent of red meat sales, pork represented 26.0 percent of red meat sales and lamb represented 1.5 percent of red meat sales (Mintel, p.17).

Nationally, meat animals are generally produced on different types of farming operations (e.g. cow-calf farms, backgrounding, feedlot operations). Calves often stay with their mothers until they reach the age of approximately 6 months, after which they often go to a backgrounder until they reach a weight of 600 to 700 pounds. At the age of 8 to 14 months the animals generally go to a feedlot until they reach market weight. Once they achieve their market weight, generally 900 to 1,400 pounds or 12 to 22 months of age (Tyson). Animals that are grass fed until they reach market weight or do not use hormone injections take longer to raise.

Once the animals reach market weight they are slaughtered and further processed into cuts for consumers. This additional processing, called fabrication, can occur either at the slaughter facility or at smaller specialized butcher shops and supermarkets that still have a butcher on site. After processing, the meat products are distributed through wholesalers or to retailers, as well as restaurants and to a much lesser extent exported (Muth, et al, ES-1, ES-2).

With the passage of time, spot or cash markets have become less common in the industry, although they are still common in Michigan, and contractual arrangements and vertical integration (where one firm owns or controls more than one stage of the marketing chain) have become more common. This is far more true for hogs than it is for cattle, but it is becoming more common for cattle as well. Traditional terminal markets for beef cattle declined from 89 percent of animals sold to slaughter facilities in 1923 to 6 percent in 1984. Arrangements between large feedlots and processing plants are now the industry norm (Lence, p.118). Few finished cattle go through auction markets; more than 80 percent of the finished cattle are sold to processing facilities or dealers (Lence, p.123).

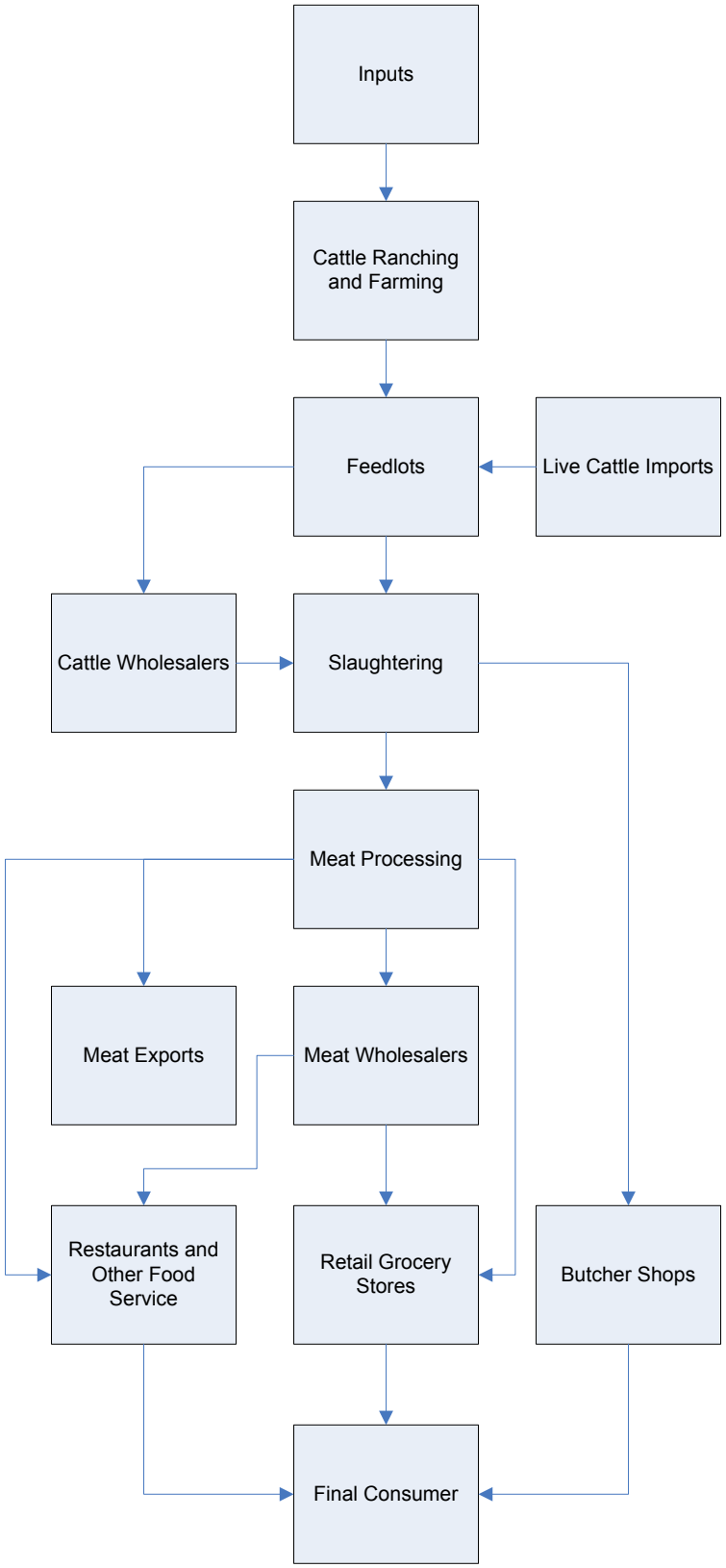
The level of concentration has increased in the beef slaughter and feedlot operations as well. Feedlots of 50,000 or more animals accounted for 16.9 percent of cattle sold in 2004 and 25.8 percent of cattle sold in 2005. Processing has also become more concentrated, from 1980 to 2004, the number of cattle slaughtered by the four largest firms increased from 28.4 percent to 70.9 percent (Boehlje, p.160).

Figure 1 outlines the beef marketing channel. The lines connecting the various stages in the marketing chain outlined in Table 1 can be accomplished in a number of ways. For example, cash auction markets are often used to purchase fed cattle for slaughter or calves for feedlots in Michigan. However, as the level of integration in the cattle market increases, contracts which specify number of animals delivered and the quality of animals delivered as well as price is becoming increasingly common as is vertical integration, one firm that operates at more than one stage in the marketing chain.

As is the case with most types of production agriculture, more and more of the output is produced by fewer and fewer farmers. The largest 2 percent of the farmers account for 38 percent of all cattle (Lence, p.128).

Small scale producers in Northern Michigan are at a disadvantage unless they act collectively or become larger and produce more animals. This less true, but true nonetheless, if they focus their output on a niche market. It is important that a critical mass is achieved in order to generate the interest of a niche market. Another alternative is selling directly to individual consumers.

Figure 1: The Beef Marketing Channel



It should be noted however, that there is a potential to increase the amount of beef cattle in the state. Currently, the state exports corn and imports beef. Given this situation and the fact that ethanol production is increasing rapidly indicates that there could be opportunity to increase beef production, particularly at the feedlot level, in the state to meet consumer demand locally.

In the beef marketing channel inputs include medicine, veterinarian services, feed supplements, breeding services etc. These inputs are used by cattle producers to raise cattle. There are three distinct phases of cattle ranching and farming, cow-calf operations where the farmer breeds the cow and raises the calf until it reaches about 450 pounds. Often the animal then goes to a backgrounding facility in which the animal is prepared for the feedlot and feeding, usually at a dedicated feedlot, in which the steer or heifer is fed a high energy diet for approximately 3 to 6 months until the animal achieves its market weight.

Many producers focus on one of these activities although retained ownership throughout the production process is becoming somewhat more common. Some producers also raised the animal from the time it is born until it is ready for a feedlot, skipping or incorporating the backgrounding stage. Feedlots are becoming larger with the passage of time. Most feedlots are located in the Southern Plains; feedlots that have more than 100,000 cattle are common in this part of the country (Johnson, p.1). To provide some type of perspective on this number, two large feedlots could hold every beef and dairy animal in Northern Michigan.

The animal is then sent to a slaughter facility where the animal is killed and is either further processed or sent to a butcher shop. The most common arrangement in the beef industry is for the slaughter facility to process the animal further and ship the cuts to the retail establishment. There are three primary retail outlets for beef products, butcher shops where the final cuts are sold to consumers, grocery stores, where most of the beef is sold, and food service, which includes restaurants, schools, and other institutions. Restaurants are an important outlet for meat products; almost 50 percent of spending on food is for items consumed away from home (Jensen, p.166).

An interesting aspect of the beef industry is that in pound terms the U.S. is a net importer of beef but in dollar terms the U.S. is a net exporter of beef (Lence, p.121). This means that the U.S. imports less valuable cuts of meat and exports more valuable cuts of meat. U.S. consumers prefer high value cuts of beef. Also, a truly high value product could find an export market.

The meat packing industry is highly concentrated. The largest four firms in the industry process more than 83 percent of the cattle in the U.S. (Johnson, p.1). It has been estimated that more than 85 percent of the beef, pork and chicken comes from plants that have more than 400 employees (Goldsmith and Martin, p.183). The largest facilities slaughter and process between 2,000 and 5,500 head per day and operate two shifts per day (Johnson, p.1). In the commodity beef industry that is dominated by these large

firms, economies of scale and cost minimization is critical. A processing plant that processes 5,500 animals per day would slaughter every beef and dairy animal in Northern Michigan in 35 days. Obviously, an effective, independent and profitable beef industry in Michigan will have to focus on specialty markets.

A typical beef processing plant (one that breaks the animal down into specific cuts) produces about 30 to 40 different cuts.

It should also be noted that the market chain for buffalo is similar to that of beef. Most buffalo farmers raise their animals to market weight and wholesaling may be more common due to the fact that this is still a small and developing market.

Lamb

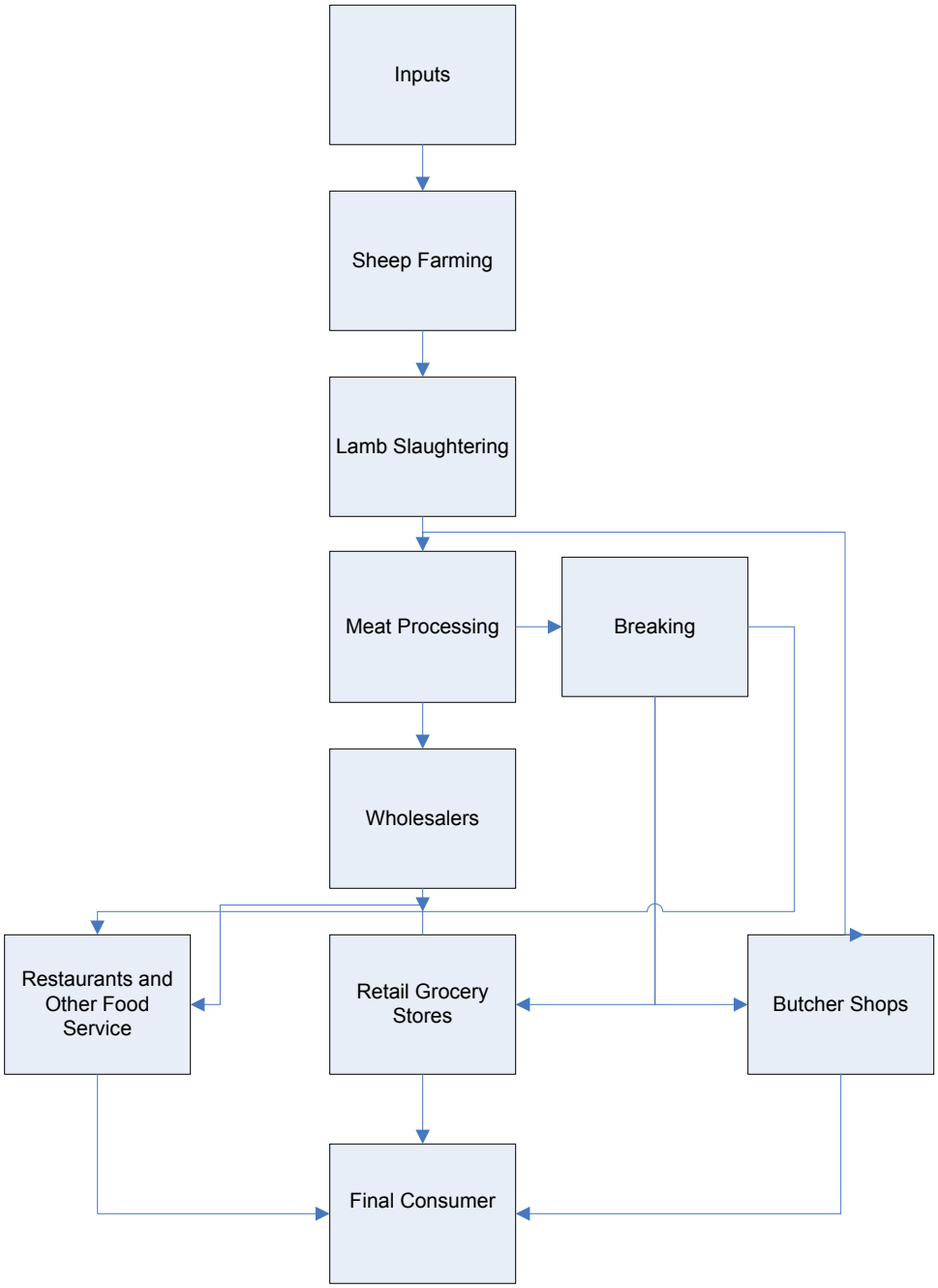
The lamb market is similar to the beef market. However, the lamb market is very small. Unlike pork and beef, few people consume lamb. Per capital consumption in 2005 was 1.2 pounds per year (Mintel, p.21). Ethnic consumers, particularly Jewish and Muslim consumers consume a disproportionate share of lamb which requires slaughtering according to their respective religious regulations. Figure 3 outlines the market channels for lamb.

Michigan is the home of one of the largest lamb processors in the U.S. Wolverine Packing handles the slaughter, processing, trimming and packing of both veal and lamb. This family owned business also sells frozen beef, pork and poultry to both retailers and the foodservice industry (Mintel, p.29).

The lamb industry does differ from the beef industry in one important respect. As opposed to beef it appears that lamb slaughtering is becoming less concentrated with the passage of time. The percentage of lamb slaughtered by the four largest firms has declined from 70.2 percent in 1990 to 66.9 percent in 2004 (Boehlje, p.16).

It should be noted that the final market and the marketing chain for goats is similar to that of lamb. As with the case of lamb, ethnic groups are major consumers of goat products. Figure 2 outlines the market chain for lamb products.

Figure 2: Market Channel for Lamb



As is the case with cattle production, backgrounding and feedlots are common with lamb production. Raising a lamb to market weight takes longer than hogs but is shorter than cattle. Lambs are weaned at 4 to 8 weeks backgrounded for 12 to 40 weeks and often fed in a feedlot for 4 to 8 weeks. It should be noted that many lambs are raised on small part-time or hobby farms and that therefore they may own the lamb from birth to market weight. Lamb production is highly seasonal with lambs born in the spring. However, the

demand for lamb is also highly seasonal around holidays and Muslim and Jewish religious events such as Passover and Ramadan.

The distribution system for lamb is similar to hogs and beef. Imports and exports are a much smaller part of the lamb industry than beef and hogs. Also, breakers are an important part of the lamb supply chain. Breakers buy the carcass whole and divide the animal into various cuts. Finding retail outlets for lamb is more difficult than beef and pork and breakers often act as a link between the production areas (primarily in the Plains and Rocky Mountain States) and the main areas of consumption (primarily cities in the East). Over time, slaughterers are becoming more engaged in processing (Muth et al, p.2-37).

Retailing

Retail distribution patterns are changing over time. While remaining the dominant retail outlet, supermarkets are losing market share to both mass merchandisers such as Wal-Mart and Costco, and specialty retailers such as butcher shops, on line sales and other types of direct sales. Table 1 shows the market share of red meat sales by retail sector.

Table 1: Retail Sales of Red Meat By Market Channel 2002 and 2004

	2002		2004 est.		
Type of Retailer	**Sales (billion dollars)**	**Market Share (percent)**	**Sales (billion dollars)**	**Market Share (percent)**	**Change in Market Share 2002-2004**
Supermarkets	32.13	85.0	33.87	76.0	-9.0
Mass Merchandisers	2.27	6.0	3.56	8.0	2.0
Specialty Retailing	3.40	9.0	7.13	16.0	7.0

Source: Mintel

The growth in specialty retailing creates opportunities for producers of specialty products and producers of high quality products. The growth of mass merchandisers also creates opportunities if the producers and processors are able to raise and process enough animals. Restaurants are also major consumers of red meat products, especially beef. This can also create opportunities, provided the quality and consistency of both the product and the supply exists. One drawback to the restaurant market especially for beef is the fact that restaurants are primarily interested in a few cuts, generally steaks. A market for the rest of the animal will need to be found.

Another positive trend in the red meat industry is that the overall demand for red meat is increasing. From 1990 to 2005, per capita meat consumption in the U.S. has increased by 12 percent; most of this increase is due to an increase in red meat consumption (Jensen, p.165).

An important consideration in operating a feedlot or a processing plant is the fact that these businesses create the opportunity to capture the profits of moving further along the marketing chain. However, this also adds to the risk and adds additional management and control stress on the ownership. It also requires ownership and management to understand the markets that they want to enter.

Economic Feasibility

Access to Labor

Access to labor is generally not an issue. The unemployment rate in the state remains well above the national average, the seasonally adjusted unemployment rate in the state stood at 7.1 percent in October of 2006. The unemployment rate in some parts of Northern Michigan is especially high. It has been estimated that the unemployment rate in Alcona County could be in the range of 15 to 16 percent in the fall and winter months. Given the relatively small number of jobs created in a small meat processing plant and feedlot – see tables 10 and 11 on pages 50 and 53, even a small community should be able to support a meat processing plant or feedlot.

Industry and economic development personnel in this part of the state were certain that there was sufficient labor to staff a processing facility or a feedlot. Another advantage of the employment situation in the part of the state was the work ethic of labor. While some workers are not highly skilled, they are considered hard working and dependable. These characteristics are desirable for meat processing operations. Additional employment would be generated by the additional economic activity generated by a processing plant or a feedlot.

One potential issue is finding a good and qualified manager for either processing plant or a feedlot. This may require recruiting someone from out of the area, if not from out of the state. However, this should not be an insurmountable problem.

Access to Animal Units

An important consideration with respect to meeting the needs of a processing plant, especially when attempting to meet the needs of a niche market is a consistent supply of animals on an annual basis. It is less of an issue with lamb and goat production given the seasonality of demand, animals can be kept on farm until demand is at its highest, although it does create an issue for a processor interested in operating a facility efficiently. Obtaining a consistent year round supply of animals was consistently identified as a barrier to expanding the processing industry in this part of the state.

It is a major issue in the beef industry. Traditionally, calves have been born in the spring and sold to feedlots and backgrounding operations in the late fall. In order to insure a stable supply of animals and to maximize the efficiency of a processing plant, farmers will have to adopt a system that allows for fall calving as well as spring calving. Given the severity of the winter in Northern Michigan, this will require farmers to manage their

cattle more intensively and insure adequate feed, shelter and water for their calves during the winter months. This will include structures that protect young calves in the winter months. Additional facilities to support calves born in the fall will be a major additional cost for farmers.

Running a typical sized slaughtering plant would be difficult given the size and economies of scale involved in livestock processing. The typical beef processing plant handles between 250 and 300 carcasses an hour (Jensen, Unnevehr, and Gomez, p.6). The largest beef processing plant in Michigan processes between 1,400 and 1,800 cattle per day despite operating only one shift per day. A small processing plant that processed 420 carcasses a day would essentially slaughter every head of beef cattle in Northern Michigan in a year.

Table 1 outlines the number of cattle (including dairy cows) and sheep in Northern Michigan. The Western part of the Upper Peninsula is not included, processing plants in Wisconsin are the likely outlet for animals in that part of the state.

Table 2: Animal Inventory in Northern Michigan			
County	**Cattle and Calves**	**Milk Cows**	**Sheep and Lambs**
Alcona	5,400	703	384
Alger	1,582	403	NA
Alpena	9,974	2,824	60
Antrim	4,035	736	678
Arenac	5,816	2,363	104
Benzie	1,282	NA	NA
Charlevoix	3,279	669	971
Cheboygan	5,066	1,090	455
Chippewa	7,394	652	1,877
Clare	11,299	2,670	235
Crawford	130	NA	32
Delta	7,273	1,694	97
Emmet	5,007	750	124
Gladwin	6,718	1,056	712
Grand Traverse	4,736	428	126
Iosco	9,683	1,836	1,171
Kalkaska	895	NA	NA
Lake	2,257	348	1,013
Leelanau	3,290	484	141
Luce	1,027	0	0
Mackinac	2,970	785	NA
Manistee	2,381	132	525
Marquette	2,692	472	88
Mason	7,930	1,130	1,085
Missaukee	23,121	1,325	409
Montmorency	2,702	654	40
Ogemaw	14,756	4,936	664
Osceola	18,072	4,956	1,705
Oscoda	3,635	1,106	404
Otsego	2,341	228	264
Presque Isle	6,681	1,491	137
Roscommon	318	0	NA
Schoolcraft	1,408	NA	0
Wexford	3,558	819	182
Total	188,708	36,740	13,683

Cattle and Calves less dairy cows 151,968

Source: 2002 U.S. Census of Agriculture

Overall, Michigan has approximately 1 million head of cattle of which 312,000 are dairy cows. The state has 1.1 percent of the total number of cattle in the U.S (Kleweno and Matthews, pp.1,59). Northern Michigan accounts for more than 18 percent of all the

cattle in the state but only 0.2 percent of all the cattle in the U.S. These figures indicate that the number of animals in the area may need to increase in order to generate enough volume to justify a processing plant, even if the target market is a small one. It does appear that this area could support more cattle (Duncan et al, p.5). Additionally, it is estimated that there are approximately 1,600 bison in 35 herds in Northern Michigan. Bison could also be slaughtered and processed along with beef at a facility.

A small slaughtering plant kills between 250 and 600 head per day. The per head costs of these plants is considerably higher than large plants. These plants often have difficulty in selling their subprimal cuts such as briskets, shin and shank meat and roasts (Johnson, p.2). This difficulty may make it easier for cattle producers to work with an existing processing plant and not operate a small processing plant on their own.

A study of operating a lamb specific slaughter and processing plant in North Dakota estimated that the size of the plant was 20,000 animals per year (Nudell et al, p.62). The state could and does support a lamb processing facility. However, if a specialized lamb processing facility is going to be successful in Northern Michigan it will have to process other animals as well or dramatically increase the number of sheep or goats in this part of the state.

Statewide, Michigan had 88,000 sheep and lambs on January 1, 2006; the average sheep producer had 44 head (Kleweno and Matthews, p.68). However, given the nature of the breeding season for sheep and lambs, these animals were likely to be breeding stock. The state also has an additional 10,000 head of meat and other types of goats (Kleweno and Matthews, p.69). The number of animals is steadily increasing, in 2005 there were 75,000 sheep and lambs and 9,200 meat goats. It has been estimated that there are between 600 and 2,000 ewes in the Upper Peninsula and 350-400 ewes in the Northernmost Lower Peninsula. There is the potential to expand this market, especially in Michigan with its large Muslim population. A premium price can be expected if the animals are processed in accordance with Muslim religious regulations (Nuddell et al, p.63).

To insure a successful lamb and goat processing facility the number of animals raised needs to be increased. One potential processor anticipates 300-400 animals processed per month to get started eventually hoping to reach a production capacity of 8,000 to 10,000 a month. In order for this to happen existing sheep and goat producers will have to expand production and new producers will have to enter the market. If these figures could be achieved, a sheep processing plant could be feasible.

A major issue in the lamb industry is the fact that there is a great seasonality in lamb production. The vast majority of lambs are born in the spring. This in turn means that most lambs reach market weight at the same time of year. This presents a severe problem for potential processors who need a consistent supply of animals throughout the year to minimize costs and operate efficiently. However, research indicates that the lambing season can be extended into the fall (Nuddell et al, p.69). In order for a processing plant to be successful, lamb producers will have to supply sufficient animals throughout the

year, and therefore change their breeding practices. This may be difficult in Northern Michigan given the relatively harsh winters and the relatively high mortality rate of lambs.

The seasonality of cattle production is also an issue. Most calves are also born in the spring. Cattle breeding practices will need to be adjusted to include calves born in the fall (Duncan et al, p.5). This is necessary to provide a sufficient number of cattle throughout the year to a processing plant or to meet the needs of a specialized market. Fall calving and lambing will increase the labor requirements and the management expertise of producers. Capital costs in the form of additional structures that provide protection to young animals will also be needed. Farmers will also need a source of hay that will last through the winter months. Feed costs to cow-calf operators will increase. However, there is sufficient potential for forage crops in this part of the state to meet this need.

The overall lack of animals in the state makes establishing a processing plant difficult. Compounding this difficulty is the difficulty of operating a processing facility that meets federal inspection requirements (Nudell et al, p.2). A federal inspector adds to the costs of operating a plant. Research in other states that lack animals, show that a livestock processing facility on a commodity basis is not feasible (Murphy, Schupp, and Lee, p.37). Some level of specialized production targeted to a specific group of consumers will be necessary. It will be necessary to target the products processed at such a facility to niche markets that capture a premium price (Nudell et al, p.2).

Access to a Renderer

Given the increased health regulations placed on processing plants and the fact that some animals die while at the feedlot, access to a renderer that is willing to dispose of dead animals and offal is important. Over time, the numbers of renderers in the state has declined making the disposal of dead animals more difficult. Rendering has become more complicated given the need to properly dispose of brain and nerve tissue due to Bovine Spongiform Encephalopathy (BSE). Considering access to renderers is important in determining the site of a processing plant or feedlot.

An alternative that is available to feedlots is composting dead animals. This could work in conjunction with a manure composting facility. Owners of cattle that are not interested or unable to handle dead animals should probably find a way to work with an existing animal processor, or insure that there is access to a renderer.

One problem small packing firms face is the fact that byproducts that create income for large processing plants are a cost for small plants (Johnson a, p.1). One group of byproducts is edible meats; these are generally organs (heart, kidneys, etc.). There are limited market outlets for these meats, primarily ethnic markets such as Mexican and Asian. Another group of byproducts are inedible meats, spleens, lungs, etc. which are primarily used for pet food. A meat processing plant that focused on organic meats could sell these meats to organic pet food manufacturers, otherwise these products will have to

be composted or otherwise rendered. Hides are another byproduct, large processing plants receive approximately $40 to $50 per hide, but small processing plants only receive about $5 per hide (Johnson a, p.2). Large packing plants also sell blood and bones, this is not feasible for most small processing plants (Johnson a, p.3).

Some parts of Northern Michigan do have sufficient access to a renderer. However, finding outlets for all of the byproducts remains a major issue. A processor will have to generate a higher price for its meat to offset the cost disadvantage of handling and disposing the byproducts.

Access to Feed

There appears to be adequate access to feed to operate a feedlot. Particularly if cattle raised in Northern Michigan were finished in a feedlot in the Southern part of the state. It is less expensive to ship cattle to a feed source than to ship feed to the cattle (Duncan et al, p.12). Futhermore, the larger processing plants are located in the Southern part of the state which would reduce costs if the owners decide to enter into an agreement with an existing processing plant as opposed to starting a new processing plant. The growth in ethanol production may increase feed prices faced by livestock producers. Corn that has been traditionally used for livestock production is being diverted to ethanol production. If the price of feed increases, the need to develop high value products will increase.

Both sugarbeet pulp and potato waste can be used as cattle feed (Wachenheim et al, p.iii). A typical feedlot operation generally feeds 80 percent grain (such as corn) and 20 percent roughage (hay, corn silage) (Wachenheim et al, p.1) to cattle as they near market weight. Feed costs can be reduced by using byproducts such as Distillers Dried Grain Solubles (DDGS) and potato waste (Wachenheim et al, p.1). Additional cost savings could be obtained by using Wet Distillers Grain Solubles (WDGS) (Stearns et al, p.18). However, to take full advantage of these cost savings locating the cattle near an ethanol plant or a potato processing plant is necessary. There is a potato processing plant in Northern Michigan. Transportation costs of DDGS and WDGS is relatively high (Duncan et al, p.5). To a lesser extent sheep can also be fed some of these byproducts.

Currently, the ethanol plants in the state have sufficient markets for their DDGS. These plants ship their DDGS by rail to other markets. It has been reported that current DDGS prices are in the range of $80 a ton. Additional ethanol plants will likely put additional downward pressure on prices and reduce the cost of this additive. However, additional ethanol plants may put upward pressure on corn prices.

Access to feed is very important to the success of a feedlot. While expenses such as yardage fees, veterinary expenses, and interest play a role in determining the profitability to producers, a major cost is feed costs, and the largest feed cost is the cost of grain (Anderson and Trapp, p.670). Variation in feed prices also affects the profitability of a feedlot (Lawrence, Wang and Loy, p.349).

Another alternative is to feed cattle pasture and hay throughout the year. In order to do this successfully, a feedlot in Northern Michigan would have to buy hay to feed during the winter months. Cattle also gain less weight when on grass feed. For this strategy to be successful, producers would have to receive a premium for their cattle or feed prices of grass and hay will have to decline dramatically relative to grain prices.

Obtaining feed and maintaining a proper feed ration for cattle at feedlots is an important consideration for producers that have traditionally been cow-calf producers. Access to high quality inexpensive feed is important for cattle at feedlots (Lence, p.117). Current conditions may not be conducive to a feedlot. Corn prices are currently high as are feeder calf prices. Furthermore, DDGS prices have yet to fall. This puts substantial pressure on a feedlot's profitability, especially if a feedlot sells cattle on the commodity market.

A cost minimizing solution is to locate a feedlot near the feed source, it is generally less expensive to transport the cattle to the feed source than it is to transport feed to the cattle (Prevatt et al, p. 55). This does not preclude producers from Northern Michigan from retaining ownership of the animals no matter where the feedlot is located.

One way to do this is by locating a feedlot next to an ethanol plant. The ethanol plant would be able to deliver WDGS to a feedlot and forego the cost of drying the feed. There appears to be a growing consensus that WDGS is a superior cattle feed than DDGS (Rust and Black). However, it also appears that distiller's grains should be less than 40 percent of a ration. This is to insure that the sulfur content in the diet is not excessive. WDGS is not a complete substitute for corn.

Other Feedlot Issues

In order for a feedlot to enhance its odds of being successful, obtaining cattle from a single source would be advisable. Cattle that come from a single source perform better in a feedlot than cattle that come from multiple sources (Abidoye and Lawrence, p.1). Commingling of cattle increases the chances that the animal will become ill which reduces the quality of the carcass (Abidoye and Lawrence, p.9). Traceability and consistent quality will also be enhanced if the cattle come from a single source.

Another issue is the amount of handling the cattle are exposed to. Generally speaking, the more interaction cattle have with humans, the calmer they are, calm animals tend to grade higher and have higher yields than wilder cattle that have not had much human interaction (Abidoye and Lawrence, p.9). It is also widely believed that calm animals are less likely to be dark cutters. A dark cutter, an animal that produces a dark colored carcass, is severely discounted in the processing plant. As a result of these issues the standard practice in the industry is for animals to remain in the same pen from the time they enter the feedlot until the time they go to the slaughtering plant (USDA, p.25). Given the TB situation in some parts of the state, a terminal feedlot (the animals go from the feedlot directly to the slaughter plant and are not allowed to go from one feedlot to another) is the only option.

Access to Transportation

Establishing a feedlot or a processing plant does add costs to the community. Additional road maintenance is one example (Duncan et al, p.5). Depending on the size and location of the facility more trucks will be on the road. Many areas in Northern Michigan have excellent roads. Locating the facility close to I-75 or U.S. 27 would further reduce costs.

Locating the facility in an area that has little truck traffic is an alternative. Nonetheless given the number of cattle and manure that will need to be transported, finding a location on a road that has no seasonal weight restrictions will be necessary. This is particularly true if a feedlot is located in Northern Michigan and feed needs to be shipped from the South. However, this is not the low cost method of feeding animals. If a feedlot has a strong interest in locating in Northern Michigan using rail transport to supply feed is a possibility.

Northern Michigan is serviced by two short line railroads, the Great Lakes Central and the Lake States Railway. The Great Lakes Central Railroad operated from Traverse City to Ann Arbor with a branch line extending from Cadillac to Petoskey. The Lake State Railway Company also has two lines, one from Gaylord to Saginaw and another line from Alpena to Saginaw with branch lines from Alpena to Rogers City and Hawks (Michigan Railroads Association). However, there is not extensive rail coverage in this part of the state which causes an issue for feedlots interested in transporting grain to Northern Michigan.

Utilities and Other Infrastructure

Despite being located some distance from the population centers of the state, many locations in Northern Michigan have sufficient access to utilities. However, if desired, rail transport is limited.

Locating in the Southern part of the state may provide cost savings in terms of transportation but access to infrastructure and utilities are not barriers to a processing plant or feedlot in Northern Michigan, especially if it is a small one.

Summary of Economic Feasibility

Northern Michigan lacks sufficient animals to economically operate a single species processing plant. This is true for both cattle and lambs. Northern Michigan is caught in a Catch 22. Processors will not expand without more animals, and producers face difficulties increasing their number of animals without access to processing. A multispecies processing plant may be economically feasible but is not recommended. Multispecies processing plants are not the industry standard, and processing more than one type of animal is not likely to minimize costs. Also, markets will have to be found for each of these species. Other contractual agreements or other methods of vertical integration could be just as profitable but at a lower level of risk.

Building a feedlot in Northern Michigan is economically feasible. There is sufficient land, infrastructure, labor, etc. for a feedlot to operate in that part of the state. There are also a sufficient number of cattle in this part of the state. This is particularly true if producers focus on pasture raised livestock or cattle with other specialized characteristics. A feedlot that uses typical levels of grain based feed would reduce its costs by locating closer to major areas of corn production. A feedlot that focuses on using grains to feed cattle would minimize its costs by locating in the Southern part of the state. Ownership could still reside with an individual, firm or cooperative located in the Northern Lower Peninsula.

Market Feasibility

Demand Drivers in the Red Meat Sector

One of the main demand drivers in the red meat sector is wellness. There are two aspects of wellness, the first is food that will not make you sick; the second is food that actually improves or promotes human health. Traditionally, red meat in general and beef in particular have had the reputation of not being healthy. This reputation is beginning to change. The USDA Nutrient Database identified 19 cuts of beef that meet government guidelines of lean (Mintel, p.10). Furthermore, half the fatty acids in beef are monounsaturated fatty acids that are purported to have cholesterol reducing abilities (Mintel, p.10).

One of the major manifestations of the interest in wellness is the increased demand for organic products. Table 3 shows to growth in organically grown meat sales from 2001 through 2004.

Table 3: Retail Sales of Organic Meat 2001-2004

Year	Sales (million dollars)	Year Over Year Change
2001	26	
2002	33	26.9
2003	62	87.9
2004 (est.)	121	95.2

Source: Mintel

From 2001 to 2004 sales of organic meat and poultry increased by 365 percent (Mintel, p.12). The interest in organics continues to grow and creates opportunities for beef producers and processors. One major difficulty facing the organic sector is the difficulty in obtaining organic feed. This may curb the potential to enter the organic market. As more corn enters the ethanol market there may be less organic feed available. However, there may be other ways to appeal to health without going organic. For example, hormone free and antibiotic free are examples of product offerings that appeal to health without necessarily being organic.

Another demand driver is the growing ethnic diversity in the U.S. The greatest impact is the growing Hispanic population in the U.S. From 1990 to 2002, the number of Hispanics grew by almost 68 percent. More than 37 million people or 13.3 percent of the U.S. population is Hispanic. Hispanics are more likely to eat beef than non-Hispanics (Mintel, p.13,14). Hispanics also tend to prefer leaner cuts of meat (Mintel, p.71).

While the commodity beef industry is dominated by large processors and farms, opportunities remain for small scale producers that are willing to provide products that command premium prices (Halbrook, Armbruster and Thompson, p. 156). In order to do that, these processors and producers need to develop products that a small, but affluent group of consumers are interested in purchasing. Ethnic products, organic, synthetic hormone free, antibiotic free, pasture raised or free range, and environmentally responsible are all examples of ways to differentiate a product from the commodity market (Boehlje, p.161).

Size of Facility

It is difficult to generate a scenario that justifies the creation of an additional processing plant. Currently, there is excess processing capacity in the state which actually creates opportunities to enter into agreements with current processors to process animals for niche markets. This would increase revenues and reduce overhead costs for the processor and reduce the barrier to entry for producers interested in retaining ownership of their animals.

Slaughter plants are primarily interested in buying from feedlots that offer at least one pen of cattle per week (Duncan et al, p.20). Assuming that cattle are at the feedlot for a minimum of 14 weeks and a pen is 60 cattle, the minimum size of the feedlot is 840. This size is not cost efficient but may be large enough to meet the needs of a niche market and still be of sufficient size to meet the requirements of a processor. This also assumes that at least 60 cattle per week will be placed in the feedlot per week every week of the year.

Another source of income for a feedlot is to feed the non-owners cattle on a for fee basis. This could add to the revenues of the feedlot and enhance the efficiency of the feedlot. However, this might increase administrative expenses. One example would be for a beef feedlot to feed out dairy breed animals and sell them on the commodity market. However, following such a strategy could reduce the feedlot's ability to produce a high value specialty product. Rising feed costs also reduce the likelihood of this strategy succeeding.

Practicality of a Feedlot

One way a feedlot can obtain profits is by being paid by the processor based on the performance of the cattle shipped to the processor (Muth et al, p.2-12). Generally performance premium is based on the grade and yield of the animal. In the beef industry this is known as pricing on the grid. This is becoming the industry standard. One

management difficulty is the increased need to manage cattle individually. Cattle that are not performing well need to be culled early. Breeding is also important. The current standard is pen management at the feedlot level, but pricing on the grid will require more intensive management of individual animals.

One issue in establishing a feedlot is the method by which farmers are to be paid. This is particularly important when farmers retain ownership of the cattle throughout the market channel. Generally speaking, cattle feedlot operators will follow a strategy of feed cost minimization when operating a feedlot. However, this may not be the optimal strategy if the producers are being paid on a grid price system, or if the cattle are being fed to meet the demands of a niche market (Rahman, p.9). This creates an incentive for the owner of the cattle to operate the feedlot themselves.

Another aspect of operating a feedlot that enhances its feasibility is the evidence that farmers that produce cattle with known feedlot performance and/or carcass potential may enhance their profitability if they retain ownership and market the cattle in a way that ensures the buyers understand the enhanced value of the animals (White and Anderson, p.1). The fact that every animal is identified also makes it easier to track their performance, and their genetic potential, which over time should improve the performance of the source herds.

Niche Market Opportunities

One way to differentiate a firm's product from its competitors is through an excellent identification system. Given the fact that cattle are already identified in Michigan this creates an opportunity for producers and others in the supply chain. However, in order to take advantage of the animal identification system, quality guarantees need to be made that further differentiates beef from Northern Michigan from the competition. Examples include products that are guaranteed tender, hormone free, organic, or locally produced to name a few. Antibiotic free and hormone free have been identified by consumers in Iowa as being desirable product characteristics (Leopold Center, p.2). Identification and traceability can provide the consumer with additional confidence that the product meets its stated standards. Consumer confidence is important in the success or failure of branded products (Carriquiry, p.1).

One product attribute is guaranteed tender. Beefmaster Cattlemen LP uses the designation "all natural tender aged beef" to market its products and apparently has been successful in obtaining a premium price for its beef (Carriquiry, p.4). One study indicates that consumers might be willing to pay in excess of 50 cents per pound for a guaranteed tender steak (Carriquiry, p.9). If successful, a firm that pursues this marketing strategy would not have to pay for grading. There is an increasing perception that USDA quality grades to not give complete information to consumers.

One firm that follows a fully integrated system is Harris Ranch in Coalinga California. This feedlot operator also slaughters and processes approximately 600 head per day. Harris ranch contracts with cow-calf producers that are required to meet rigorous

specifications before cattle enter the feedlot. The goal of the feedlot is to insure that the cattle grade choice which is a higher grade than most California cattle. Harris cattle also sell pre cooked roasts and other entrees as well as operating its own restaurant that sells its own beef (Johnson, p.3).

Another way to develop unique products that appeal to consumers is by offering products that appeal to consumers interested in a safe food supply. Consumers worried about *E. coli* O157:H7 may be interested in buying meat products that meet and exceed the industry standards in terms of a processing and safe handling of meat. However, reduction in pathogens can only be achieved at a higher cost (Jensen, Unnevehr and Gomez, p.11). Consumers must be willing to pay the higher cost in the form of higher prices, and the processor must be able to signal the enhanced food safety attributes to the consumer in order to obtain a premium price. For example one consumer survey indicated that 40 percent of consumers were worried about hormones and additives in meat (Mintel, p.51). This represents a large consumer segment.

Selling grass raised cattle is another way to sell a product with unique characteristics. Grass fed beef tends to have less fat that grain fed beef. Grass fed beef is also easier to gain organic certification than grain fed beef. Grass fed beef also precludes the necessity of an expensive feedlot, although a terminal operation probably would have to be created in order to collect the animals. However, raising grass fed beef is far more time consuming than finishing cattle on corn or other grain. Furthermore, given the weather conditions in the state, producing grass fed cattle is difficult and relatively expensive. Access to large quantities of high quality hay and other forages will be necessary to feed cattle in the winter.

An important consideration when producing for a niche market is the fact that customers need assurance of the source of the product. Is the product what is purports to be? The fact that every head of cattle is identified makes it easy to verify product claims, and provides a competitive advantage for producers in Northeast Michigan. If handled the right way, Radio Frequency Identification Devices (RFID), which keep track of all cattle, can be used to enhance the profitability of a feedlot.

Another market alternative is to gear products to ethnic markets. Ethnic dining experiences are becoming more common (Nudell et al, p.17). This is due to the growing non-native born population in the U.S. as well as U.S. born consumers becoming increasingly interested in cuisine from other countries. This creates a particular opportunity for sheep and goat producers.

One important consideration in marketing to a niche market is to focus on a positive message (Ingram and Miller, p.2). Marketing efforts that focus on the competition or commodity markets meat failures will likely only confuse consumers.

A good summary of the issue facing small scale operations was expressed by Connecticut organic farmer George Purtill who stated: "Any small farm has got to find niches to survive; you cannot compete with people who have thousands of acres and can buy feed,

fertilizer, and seed in train car loads." (MacMillan). In the absence of large animal numbers and economies of scale, niche marketing is the only viable option. This belief has been supported by others in the Michigan cattle industry.

Level of Competition

The state had 18 beef processing facilities as of 2002 (Muth et al, p.2-15). Of this amount 16 were small facilities (fewer than 10 employees), one was a medium sized facility (between 10 and 499 employees) and one was a large facility (500 or more employees). The largest beef facility in the state only operates one shift per day. There is clearly an opportunity to process more animals in the state.

There are 2 small facilities in Northern Michigan, one located in Cheboygan and the other located in Lake City. Lack of a stable, year round supply of cattle has kept the industry from expanding in Northern Michigan. It appears that there is more than enough capacity in the beef industry to process the cattle produced in the state. Additional beef processing plants may have a difficult time in obtaining a sufficient number of cattle to operate efficiently. One way to address this issue is by processing more than one species of animal. Another way is to enter into an arrangement with an existing processor.

The state also had 18 hog processing plants in the state as of 2002 (Muth et al, p.2-28). Many of these plants also processed cattle. All but one of these plants had fewer than 10 employees. There was one medium sized plant. The same three plants that processed beef also processed hogs in Northern Michigan.

The state had 10 processing plants that handled lamb. One, in Detroit, is fairly large by national standards. Three of the 10 plants were located in Northern Michigan.

While a multispecies plant would increase the utilization rate of a processing facility, it also creates some difficulties. Equipment would have to be flexible enough to slaughter and process more than one type of animal. Employees would have to be trained and have the expertise to process more than one type of animal. Markets for different species of animals would also have to be found. Finally hogs are handled in an "all in all out" basis and the facility is washed and disinfected before new hogs are introduced in order to minimize the risk of infection (Muth et al, p.2-25).

Competition is also nationwide as well. Most of the feedlots and processing facilities are located in the Southern Plains, Colorado and Nebraska. Large feedlots with capacities in excess of 32,000 head handled 42 percent of all cattle in the U.S. in 2001 (Muth et al, p.2-17). The number of feedlots declined from 1996 to 1999, this was due to a reduction in feedlots of 1,000 head or less (USDA, p.9). From 1995 to 2000, the number of beef feedlots in Michigan declined by 10 from 210 to 200 a decline of approximately 5 percent (USDA, p11). It would be difficult for producers in Northern Michigan to achieve the size common in the Southern Plains. Large scale processing facilities tend to be located near these feedlots and others have some type of contractual arrangement with these feedlots (Muth et al, p.2-18).

There has also been a shift in beef processing. Processing facilities have moved to where the large feedlots are located. Kansas, Nebraska, and Texas have increased their beef processing capacity at the expense of other states (Duncan et al, p.8). Michigan is one state that currently has excess capacity in beef production. This overcapacity reduces the potential profitability of new processing facilities but also increases the potential for a joint venture or strategic alliance with existing processing plants.

The beef industry has become highly concentrated. It appears that the primary driver for this concentration is to obtain economies of scale and reduce the cost of production as opposed to obtaining market power for its own sake (Tostao and Chung, p.10). As a result competing on the basis of price is not a viable option for beef producers in Northern Michigan. To offset this cost disadvantage Northern Michigan has relative to feedlots in the Central and Southern Plains, offering a product that appeals to a niche market will be necessary (Duncan et al, p.2).

Pricing Issues

There are a number of ways to price beef. One way is through grid pricing. Farmers that produce cattle that have a high grade and generate carcasses that produce a lot of usable meat (yield) are paid a premium. Farmers that do not produce cattle with these desirable characteristics receive a discounted price for their cattle. Most grid pricing is done in conjunction with a contract, or as part of a cooperative or alliance (Ward, p.3). In order to produce high quality products that meet the needs of a small group of consumers a price signal that producers will respond to will need to be in place. Clearly producers of above average cattle have an incentive to price using this method (White and Anderson, p.14).

In many respects grid pricing is similar to multiple component pricing (MPC) in the dairy industry. Dairy farmers are paid a premium or receive a deduction on their milk check depending on the amount of protein or nonfat solids in their milk as well as the level of somatic cells in their milk. Over the past 20 years MPC has become the standard in the dairy industry and it is likely that grid pricing will become the standard in the beef industry. In 2001, 15.6 percent of cattle were sold using a grid, it is expected that that figure will rise to 62 percent in 2006 (White and Anderson, p. 3). Given the level of integration and the standardization of hog production, grid pricing is not as common. The lamb market appears to be too small for this to be as common a practice as it is in the beef industry.

Grid pricing will affect the management practices of beef producers. Farmers will need to focus on genetics that targets animals that grade well and have high yields. Proper feeding and handling of animals will also be important (Forristall, May and Lawrence, p.3).

Market Plan Scenarios

There are several market plan scenarios that could be successful for a feedlot. A feedlot could enter into a contract with an existing processor and retain ownership of the carcasses. The owner of the feedlot could sell a branded product or attempt to sell to the food service industry. A major issue in this scenario is determining ownership and obtaining market access of less desirable cuts of meats.

In order to sell a product at a premium it must possess characteristics that consumers are willing to pay more for. Examples include guaranteed tender, organic, locally produced, hormone free and antibiotic free. Each of these product characteristics appeals to a group of consumers who desire a high quality product. Antibiotic and hormone free products have been identified by some processors and others as having some potential for market development.

Another scenario is to sell the cattle to a firm that pays a premium to producers. Examples include Niman Ranch and Laura's Lean Beef. In order to successfully sell to these firms, producers have to meet the conditions set forth by these firms. This strategy has the advantage of being focused on production. Risks and costs associated with marketing and retained ownership are avoided. Conversely, some profit potential is foregone by selling the animals is lost. However, the costs of raising cattle are often increased in order to meet the standards of firms that sell a premium product. Comparing the additional revenues and the additional costs is the single most important management decision in determining whether or not to enter into an arrangement with an upscale processor.

A third scenario is direct marketing, selling the product directly to consumers through the internet, catalog sales etc. This is a possible scenario for both a feedlot and a processing facility. This market is becoming more and more competitive, firms such as Omaha Steaks and Cabela's, and Niman Ranch to name a few are already offering these types of products. While the potential for profits are high so is the potential for a loss. Clearly offering a compelling story or rationale for buying these products is necessary.

Consumers interested in a locally produced product that is custom processed for that consumer is another potential outlet. However, the number of consumers willing to undergo the time and expense of buying an animal and then having it processed is likely to be small, but extremely profitable for a producer. Some producers of cattle and buffalo in Northern Michigan have been successful in pursuing such a strategy. However, expanding that market is difficult, and the producer must also act as a sales manager in order to be successful.

It is difficult to come up with a marketing scenario that would generate a successful processing plant. One such scenario is processing animals in accordance to Muslim dietary laws. This has the most potential with respect to lamb processing. However, as discussed in the economic feasibility section, this part of the state lacks sufficient numbers of animals to support this type of facility.

Two Examples

The following paragraphs outline two examples of specialty beef companies: Laura's Lean Beef and Niman Ranch. These are examples of some of the ways firms in the meat industry can offer differentiated products. This analysis should not necessarily be construed as an endorsement of their activities per se, but to provide background information on the types of standards that specialty processors expect from their cattle producer partners.

Laura's Lean Beef One example of specialty beef is Laura's Lean Beef, headquartered in Kentucky. Laura's Lean Beef has entered into an alliance with the North American Limousin Foundation and the American – International Charolais Association. Laura's Lean is also working with the Simmental, Gelbvieh, Piedmontese and Belgian Blue Association to supply cattle. All the cattle must be raised without hormones or antibiotics. In addition the following management practices must be followed.

Pre-Weaning

1. Clostridial (7-way or 8-way)
2. Haemophilus somnus
3. Respiratory (IBR, BVD, PI3, BRSV) – killed or modified live vaccine
4. Castration

Weaning

1. Clostridial (7-way or 8-way)
2. Haemophilus somnus
3. Respiratory (IBR, BVD, PI3, BRSV) – mandatory modified live vaccine
4. Internal/external parasite control
5. Weaned 30-60 days (30 days minimum, 45 days recommended)

Yearling

1. Clostridial (7-way or 8-way)
2. Haemophilus somnus
3. Respiratory (IBR, BVD, PI3, BRSV) – mandatory modified live vaccine
4. Internal/external parasite control

Finishing

1. All cattle must be fed a minimum of 500 IU of vitamin E per head per day for at least 100 days before slaughter.
2. All cattle must be fed Bovamine, 1 dose per day (1 gram) per head for at least 100 days before slaughter (www.laurasleanbeefcattle.com).

Laura's Lean Beef also has several bonus programs. The firm offers $100 a head premium for exotic bulls that have not used growth hormones or antibiotics throughout their life and $50 a head for bulls free of antibiotics and growth hormones the last 20 months of their life. If a farmer has several bulls destined for slaughter, Laura's Lean will pick up the bulls and pay freight (laurasleanbeefcattle.com).

Bonuses are also available for cow/calf producers, and finished beef. Bonuses are paid to producers based on yield and grade. In addition, the firm supplies producers with free trucking to slaughter, free carcass information, free Laura's ear tags and free consulting from Laura's Lean Beef Representatives. Additional information is available at the firm's website, www.laurasleanbeefcattle.com.

Laura's Lean Beef is interested in buying cattle from Michigan and are interested in additional feeders in the state. They do use a grid system to determine the value of cattle and reward muscled cattle and are very sensitive to ribeye size and fat cover. While they will buy English breeds that meet these criteria it is easier for Continental breeds to meet the standards. The firm prefers to buy cattle in truckload numbers of 45-50 at a minimum with a preference for lots of 150 to 300 at a time.

Niman Ranch Another beef processing firm with standards similar to Laura's Lean Beef is Niman Ranch based in Oakland California. In addition to beef Niman Ranch also processes pork and lamb products. As opposed to Laura's Lean Beef, Niman prefers animals that are Angus or Angus crosses. Niman Ranch does not deduct producers for selling heavy cattle and fully 30 percent of the animals grade Prime and only 1 percent grade Select. Niman Ranch also requires full traceability, which is an advantage to Michigan producers that are already required to provide full traceability (Niman Ranch). Each animal as a unique tag that stays with that animal until processing.

Niman Ranch gives priority to farmers that are family owned and operated. A producer needs to be approved by Niman ranch before it can sell to the firm. The feeding of animal byproducts is banned as well as the feeding of antibiotics or growth hormones (Niman Ranch). Niman Ranch only buys finished cattle that are produced at a feedlot that is approved by the company. Whenever possible, cattle from a single source are fed together (Niman Ranch).

Niman Ranch also has a protocol with respect to processing plants. The facility must be designed to minimize the stress of the cattle. Also whenever possible, the animals are to be delivered to the processing plant the evening before they are to be slaughtered. Processors are USDA inspected facilities (Niman Ranch). A major issue faced by Michigan producers is the fact that the processing facility is located in Utah. This makes it difficult for Michigan producers to market to Niman Ranch.

Niman Ranch also does a great deal of direct sales through the telephone and internet. More information about Niman Ranch, including a complete list of protocols for producers, can be found at its website, http://www.nimanranch.com.

Commitment of Meat Buyers

One critical aspect, if not the critical aspect, of a feedlot or processing plant is finding customers that are willing to pay a premium price for their product. One processor identified this as being very important for the success of a processing plant. Without

market access a processing plant, no matter how large or small will not succeed. This is necessary because of the higher costs incurred by the feedlot or processing plant (Osborne and Bingen, p.15). This may require additional marketing efforts by the owners of the processing plant or the feedlot.

One issue facing a processing plant or any firm is finding customers. For example, farm markets can be unpredictable and may not be open throughout the year (Osborne and Bingen, p.4). Direct marketing also places additional stress on the farmers who also have to act as sellers of the product in addition to being producers. Farmers who are interested in marketing their products as locally grown and produced may have to educate consumers as to the value of locally produced products (Osborne and Bingen, p.7).

However, there does appear to be consumer interest in locally produced food. Markets such as Traverse City and other cities in the Northwest Lower Peninsula can have potential, especially at upscale restaurants or specialty grocery stores. These market segments can also be less price sensitive than commodity meat market segments. Another way to identify buyers is to look for assembled groups that would be interested in the product attribute that the processor or feedlot operator provides. (Leopold Center, p.3). This could include food cooperatives, organic food stores, health food stores, and natural food restaurants.

One major beef buyer does not differentiate on the basis of specialty traits. Purchases are basically at the commodity level, price premiums will be difficult to obtain. However, that buyer is interested in purchasing additional cattle including buying directly from feedlots and is very flexible with regard to number of cattle purchased and time of year purchased. Other purchasers of cattle also expressed an interest in buying animals. There is sufficient interest in cattle.

There is also likely to be sufficient interest in lamb products provided the lamb is geared toward ethnic markets. According to one source, 300,000 people of Arab decent live in Southeast Michigan making it the second largest Arab community in the world outside of the Middle East (Knudson, p.4). A processing plant interested in meeting the needs of these consumers should follow Halal standards. In order for meat to be Halal it must be slaughtered by Muslim butcher, who says a prayer to Allah and the animals must be drained of blood before processing (Morrison, 4). The animal's head must also be facing Mecca at the time of slaughter (Larson and Thompson, p.2).

Commitment of Producers

At least one beef cooperative in Northern Michigan is willing to expand its beef production as well as to produce calves in the fall as well as the spring. Interest was also expressed in meeting the quality requirements of a niche market. Cooperative management is also willing to enter into a partnership with an existing meat processing plant.

In order to be successful, the owners of the feedlot need to produce animals that have desirable characteristics that will command a price premium. Producer commitment is not an impediment to a feedlot or a processing facility provided that financing hurdles can be overcome.

Summary of Market Feasibility

There are several potential feasible marketing strategies for owners of a feedlot. Examples include retaining ownership and selling the products to specialty retailers or food service firms, or by selling the animals to existing processing and marketing firms. If ownership is retained the best strategy is probably to enter into an agreement with a processor that has excess capacity. Producers in the beef sector have indicated a willingness to alter their production patterns to meet the conditions of consumers or specialty processors. A strategy that appeals to a small number of consumers who are willing to pay a premium price (niche market) is the recommended strategy.

Given the excess capacity in the meat industry in Michigan, operating a beef processing facility is not feasible from a marketing perspective. A dedicated sheep and/or goat processing plant that is targeted toward the Muslim market might be feasible if the market is large enough and sheep and goat producers in Northeastern Michigan are able and willing to increase their production. There is a definite potential to increase the size of this market, and there is not a great deal of competition.

Technical Feasibility

Engineering of a Meat Processing Plant

A meat slaughtering plant needs to carry out the following activities in rapid succession. This process is for beef; other animals may differ slightly but the process is similar.

1. The animal is rendered insensible. Electric shock or other method is used to stun the animal.
2. The animal is shackled by the hind leg, and goes to the sticking area where the animal is killed and bled.
3. The carcass is then skinned.
4. The internal organs are removed from the carcass with the exception of the kidneys.
5. The carcass is then split down the middle and the tail is removed.
6. The split carcasses are then washed and dried.
7. The sides are then sent to a cooler (Ensminger and Perry, pp.593-594).

Slaughtering animals varies somewhat according to Jewish and Muslim regulations. For example both Jewish and Muslim clergy slaughter the animals. The blood must also be completely drained from the carcasses and in the case of meeting Muslim regulations the animal must also face Mecca.

Once slaughtered most carcasses are also fabricated or processed into retail cuts (Ensminger and Perry, p.595). The process is as follows: after chilling the carcass is broken into cuts, vacuum-sealed, boxed, moved into storage, loaded into trailers and shipped to retailers. Many of the processes are computer controlled (Ensminger and Perry, p.595). Commodity based processing plants run on very narrow margins, proper processing of hides and other carcass byproducts are necessary to ensure profitability. Byproduct markets are often closed to small livestock processors that do not generate sufficient volume to obtain the interest of consumers of the byproducts.

A North Dakota study of a lamb processing plant that processed 20,000 lambs a year yielded negative returns (Nuddell et al, p.63). Building and equipment investment was $1.5 million, of which $1.2 million was equipment, which included refrigeration equipment, new slaughtering and processing equipment, sausage making equipment and a smokehouse (Nuddell et al, p.72). Annual plant operating expenses was $3.0 million and revenue from lamb sales was $2.8 million (Nuddell et al, p.63). There are also additional costs of upgrading an existing building so that it meets federal regulations. Building and equipping a small processing facility is very expensive.

One way to enhance profitability is to find a way to increase receipts by offering a product that commands a higher price, or by slaughtering lambs on a custom basis with an existing processor. This would allow lamb producers to gain access to a specialty market without incurring the costs of the building and equipment and thereby reduce risk (Nuddell et al, p.63). It also allows lamb producers to ramp up production if the market grows.

The annual cost of a small processing plant (5 line employees 80 lambs a day) is outlined in table 4. The major cost, the cost of the animals that are slaughtered in the facility is not included. Even in the case of retained ownership, the foregone cost or value of the animals slaughtered at the facility needs to be considered. Further labor costs are outlined in table 10 on page 49. It is assumed that the plant runs at 100 percent capacity. Operating at full capacity reduces the cost per animal processed and enhances operating efficiency. In order to operate at full capacity, producers will need to supply a constant level of animals throughout the year. It is important to note that these costs do not include the value of the animals slaughtered. Costs would be considerably higher if the value of the animals slaughtered were included.

It should be noted that the costs outlined in table 4 are estimates, the actual costs of operating a small processing facility may vary somewhat.

Table 4: Estimated Operating Costs of a Small Meat Processing Plant		
Cost Category		**Annual Cost**
Depreciation	$	157,000
Insurance		40,000
Principal and Interest		119,000
Other Operating		57,000
Salaries and Fringe Benefits		333,750
Travel, Dues, etc.		1,400
Office Expenses		10,600
Advertising		1,400
Property Taxes		0
Water		5,400
Electricity		7,700
Fuel		13,800
Laundry		1,900
Slaughter Supplies		30,700
Miscellaneous		1,900
Offal Disposal		39,600
Total	**$**	**821,150**

Source: From Nuddell et al

Deprecation is based on an existing building. Purchasing and building a new facility will add to the cost. One estimate of a land purchase and building construction of a new, very small, multispecies processing facility in Northern Michigan put the cost at $750,000 – including equipment for the processing facility. This cost could be reduced if an existing unused facility were purchased. Apparently, such a facility exists in Cheyboygan. Additional information on salaries and benefits is found in table 10 on page 49.

It is also assumed that the facility will qualify for tax breaks, one of which is an exemption from property taxes. There is an existing Agricultural Processing Renaissance Zone in Northern Michigan that is not currently being used. Although this exemption will not last forever, it does reduce operating costs for several years. Principal and interest costs can also be reduced if more equity by the owners of the firm is put into the facility. This example assumes a 40 percent equity share by the ownership with 60 percent being loans. This is a typical situation in meat processing plants owned by a cooperative. Buying used equipment could also reduce costs.

These cost estimates are also based on putting the processing plant in an existing building and bringing the building up to standards for a processing plant. Building a new processing plant from the ground up will increase the cost of the plant quite dramatically.

Nonetheless given the operating costs involved in a processing plant and the uncertainty involved in obtaining sufficient number of animals, a processing plant is not likely to be

technically feasible. The costs are simply too high. Farmers in one North Dakota beef cooperative came to this conclusion when they analyzed the potential of a processing plant in that state (Nickel).

Engineering of a Feedlot

Physical Facilities A typical feedlot requires a feed handling building, a cattle processing barn, a cattle hospital barn, an office, a maintenance shop, feed handling facilities, equipment, a truck scale, corrals, gates, working chutes, feed bunks, hay racks, mounds, access to water, a livestock scale and a method to handle manure (Stearns et al, p.3).

The following are assumptions for a feedlot facility: 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, and the hospital area loading and unloading and feed processing areas are located near the center of the lot to minimize transportation costs within the lot (Duncan et al, p.9).

Table 5 outlines the fencing and feed bunk requirements for a 1,000 head and 5,000 head feedlot.

Table 5: Estimated Fencing and Feed Bunk Requirements for a 1,000 and 5,000 head Feedlot

Item	Number of Pens	Total Head	Fencing Per Head	Total Fence (feet)	Total Bunk (feet)
1,000 Head Feedlot					
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					
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**

Source: Duncan et al

As is the case with the figures in table 4, the figures in table 5 and succeeding tables are estimates, and are used for illustrative purposes. The actual costs of a feedlot may vary.

One advantage of a small feedlot is its small footprint. A 1,000 head feedlot only takes up 12 acres; a 5,000 head feedlot takes up 60 acres. Siting issues will be easier to address with a small feedlot, an important consideration given Michigan's regulatory environment.

As is the case with meat processing, feedlot operations exhibit strong economies of scale (cost per head declines as the number of animals in the feedlot increases). Table 6 outlines the cost of land and lot equipment costs for a 1,000 and 5,000 head feedlot.

Table 6: Estimated Lot Equipment and Land Improvements for a 1,000 and 5,000 Head Feedlot		
Item	**Quantity**	**Cost**
1,000 Head Feedlot		
Waterers (number)	4	$ 2,600
Light (number)	10	10,000
Gates (number)	23	3,300
Scale (number)	12	5,900
Wells (number)	1	8,000
Windbreak (linear feet)	500	4,600
Corral (linear feet)	5,806	36,500
Working (linear feet)	800	56,700
Plank (linear feet)	441	2,800
Feed bunks	1,137	22,000
Lagoon (cubic yards)	1,000	14,700
Ditiching (cubic yards)	1,000	1,800
Cemet		29,110
Land (acres)	12	24,000
Total		**$ 222,010**
5,000 Head Feedlot		
Waterers (number)	17	11,300
Light (number)	25	24,800
Gates (number)	115	16,600
Scale (number)	1	99,000
Wells (number)	1	8,000
Windbreak (linear feet)	2,040	18,900
Corral (linear feet)	25,206	158,800
Working (linear feet)	3,000	21,300
Plank (linear feet)	2,205	13,900
Feed bunks	4,550	88,000
Lagoon (cubic yards)	50,000	73,400
Ditiching (cubic yards)	5,000	9,000
Cemet		172,000
Land (acres)	60	120,000
Total		**$ 835,000**

Source: Duncan et al

On a per head basis, land and equipment cost is equal to $222 per head for a 1,000 head feedlot and $167 per head for a 5,000 head feedlot. It is easier to cover these fixed costs with a somewhat larger facility than a smaller facility. The cost of land is assumed to be $2,000 an acre; this number may be higher or lower depending on where the feedlot is located. Transportation costs and regulatory issues are probably a more important issue than the cost of land. This is especially true given the rising cost of transportation and the potential of higher feed grain prices resulting from the increase in ethanol production.

Table 7 outlines grain handling equipment and building costs for a 1,000 and 5,000 head feedlot.

Table 7: Estimated Grain Handling Equipment and Buildings for a 1,000 and 5,000 Head Feedlot			
Item	**Size**	**Number**	**Cost**
1,000 Head Feedlot			
Office	40X50X14	1	$ 28,000
Grain Bin	8,000 bu	1	11,700
Leg	2,000 bu. per hour	1	9,500
Overhead bin	1,700 bu	1	8,000
Misc. equipment			8,300
Total			**$ 65,500**
5,000 Head Feedlot			
Office	60X50X16	1	$ 60,600
Processing Building	48X48X12	1	29,900
Grain Bins	20,000 bu	2	58,600
Leg	3,000 bu. per hour	1	11,800
Overhead bins	1,700 bu.	2	16,100
Misc. Equipment			29,500
Total			**$ 206,500**

Source: Duncan et al

The per head building and grain handling cost for a 1,000 head feedlot is $65.50 per head; the per head building and grain handling cost for a 5,000 head feedlot is $41.30 per head. It should be noted that these estimates are based on new state of the art facilities; buying used equipment would reduce the cost. Also, locating a feedlot near an ethanol plant may also reduce some of the grain handling cost if a just in time delivery system of WDGS or DDGS to the feedlot was adopted.

New technologies and feeds have the potential to eliminate the need of leg. If a leg is not used the grain handling cost for a 1,000 head feedlot falls to $56,000 or $56.00 per head. The cost for a 5,000 head feedlot falls to $194,700 or $38.94 per head.

Table 8 outlines equipment requirements for a 1,000 head and 5,000 head feedlot.

Table 8: Estimated Equipment Requirements and Costs for a 1,000 and 5,000 Head Feedlot

	1,000 Head Feedlot		5,000 Head Feedlot	
Item	**Number**	**Dollars**	**Number**	**Dollars**
Tub Grinder	1	70,100	1	70,100
Feed Truck	1	60,300	2	167,800
Loader Tractor	1	61,500	1	80,300
Tractor	1	23,600	1	39,700
Snow Blower	1	4,000	1	4,000
Scraper	1	3,200	1	3,200
Mower	1	3,800	1	3,800
2wd pickup			1	17,200
Used 4wd Pickup	1	11,900	1	21,200
1 Tandem Truck	1	47,300	1	86,000
Dump Truck			2	172,000
Trailer	1	7,900	1	7,900
Post Hole Digger	1	2,500	1	2,500
Hybrid Chute			1	7,700
Squeeze Chute	1	1,700	1	1,700
Total		**297,800**		**685,100**

Source: Duncan et al

The per head equipment costs for a 1,000 head feedlot is $298 per head and the per head equipment costs for a 5,000 head feedlot is $137 per head. There are substantial economies of scale for larger feedlots.

Table 9 is simply a summation of the estimated capital costs for a 1,000 and 5,000 head feedlot.

Table 9: Estimated Capital Cost Summary

Feedlot Size	Land and Lot Equipment	Grain Handling Equipment and Buildings	Equipment	Total	Cost Per Head
1,000 Head	$ 264,110	$ 65,500	$ 297,800	$ 627,410	$ 627
5,000 Head	835,000	206,500	685,100	1,726,600	345

Source: Duncan et al

It should be noted that these figures are estimates and may not reflect the actual costs of the feedlot. However, it does reflect the fact that on a per head basis larger feedlots are more efficient from a cost perspective than a smaller feedlot. Despite the efficiency of a larger feedlot, the initial capital costs are much larger.

Manure Management One issue of importance in determining the technical feasibility of a feedlot is manure management. A feedlot will need to provide a Comprehensive Manure Management Plan in order to begin operation. Feedlots tend to concentrate the amount of manure produced in a fairly small area. Issues involving the transport and handling of manure become important especially given the bulkiness of manure in it raw form (Unterschultz and Jeffery, p.1). Traditionally, the primary method of manure disposal has been applying to farmland as a fertilizer or soil conditioner. However, given the amount of state owned land in the Northern Lower Peninsula this may not be feasible. One way to address this issue is by composting the manure. Composting reduces the volume of manure (and thereby reduces the cost of transportation) at the cost of reduced nitrogen content (Unterschultz and Jeffery, p.iii).

Composting offers several advantages. It is relatively inexpensive, reduces the level of odor, reduces the volume and weight of manure making it easier to transport and many pathogens and weed seeds are destroyed as a result of the heat generated by the composting process. The nutrients in composted manure are also less likely to leach into groundwater (Unterschultz and Jeffery, p.9). Potential markets for composted manure are greenhouses, nurseries, and organic farms (Unterschultz and Jeffery, p.10).

Another relatively simple way to dispose of manure is to give it away. This is becoming more common in the feedlot industry. In 1999, almost 27 percent of feedlots gave their manure away (USDA, p.35). This can be done in conjunction with operating a composting facility. Despite the potential to give the manure away, there is no guarantee that there will be sufficient interest to remove all the manure a feedlot produces using this method.

Another way to handle manure is through the use of an anaerobic digester. A digester can be used to generate methane gas which in turn can be used as a power source for the feedlot. The methane gas captured and burned can also be used to sell carbon credits on the Chicago Climate Exchange, which can also create an additional, although small source of revenue for the feedlot.

An anaerobic digester works in the following manner: manure is placed in the digester where bacteria break down the manure and as part of the process methane gas is captured. Anaerobic digesters have several positive attributes: they reduce the amount of offensive odors caused by the feedlot, there is a potential to capture and generate energy from the methane gas, and pathogens are destroyed (Unterschultz and Jeffery, p.9). However, given the initial cost of digesters and the fact that the straw needs to be separated out of the manure, digesters may not be the most economical solution (Unterschultz and Jeffery, p.9). As a result of these facts, composting may be the most effective method of manure management.

Site selection of the feedlot will be important. If the feedlot is located in Northern Michigan manure disposal is less of an issue, provided there is sufficient land in the area to apply the manure directly on to the land without excessive environmental degradation. If the feedlot is located near grain supplies, it will be important to locate the plant near

land that can handle the additional manure or the feedlot should treat manure as a waste product and look for ways to reduce the nitrogen and phosphorus content in the manure (Untershultz and Jeffery, p.7).

The overriding concern for a feedlot with respect to manure management is despite the discussion and belief that manure is a resource, for a feedlot proper handling of manure is a cost (Unterschultz and Jeffery, p. 26). As a result a manure management system that minimizes cost should be the overriding concern.

Quarantined Farms/Terminal Lot

The Animal Industry Act of 1988, Chapter 287 of the Michigan Complied Laws (MCL) defines a terminal operation as a lot, parcel, pasture, premises, facility or confined area (MCL 287.713a). A terminal operation would include a feedlot, or other enclosed facility such as a fenced in pasture. Terminal operations are primarily geared toward containing cattle, privately owned cervids (deer) and goats. There are several important regulations and policies that encompass a terminal operation. The first is that all terminal operations have to be registered with the Department of Agriculture and must be inspected by the department as well (MCL 287.713a (2.3)). A terminal operation must also be constructed in such a way as to deter other animals from coming in contact with the livestock enclosed at the terminal operation.

An important consideration for livestock producers in Northern Michigan is the treatment of animals with respect to Bovine Tuberculosis (TB). A terminal operation may accept livestock that have not been tested for TB provided that the herd of origin has been tested for TB (MCL 287.713a (7)). Complete paperwork including electric identification of all the animals, the source of the animals, and destination of the animals is also required (MCL 287.713a (14)).

Animals may only exit a terminal operation by being transported directly to a slaughtering establishment, directly to another terminal operation, or through a livestock auction market for slaughter only, or to a veterinary hospital (MCL 287.713a (10). These animals are not required to have an additional TB test. However, it has been stated that some processors are unwilling to accept animals from that part of the state that does have TB in the wildlife without some proof that the animals do not have TB despite the fact that the state does not require it and the animal will not be alive long enough to pass it on even if it did have the disease. The upcoming requirement that all cattle possess RFID should address most, if not all, of these concerns.

Testing is an additional cost for producers in the area and it places them at a competitive disadvantage. This creates another incentive to produce a high quality product that commands a premium price. Producing animals for a processor that requires identification neutralizes this cost disadvantage.

Environmental and Regulatory Issues

Meat Inspection One thing all processing plans have in common no matter what type of animal processed is the need for meat inspection to insure that the meat is safe for human consumption. Currently, Michigan does not have a state meat inspection system so a federal inspector is required. Cattle and lambs are also graded by the USDA Agricultural Marketing Service (Muth et al, p.2-24). Grading deals with the quality of the meat, not the safety of the meat.

Federal law allows for exemptions for custom plants that slaughter and process meat for the owner of the animal for the owner's personal consumption. The carcass cannot be sold. Retail exempt plants such as grocery stores, are also exempt provided the carcasses they purchased were from a federally inspected plant (Nuddell, p.66).

The cost of meeting USDA regulations can be quite high. USDA inspected plants are required among other things to test for E. coli and salmonella. These plants must also have a process to identify and separate Specified Risk Materials (SRM), brain, nerve, and other matter that could contain BSE. However, to be eligible to sell to the public the processor must be USDA inspected. As a result, it is all but impossible for a small processing plant to establish itself, unless it bypasses the USDA regulations by operating as a custom slaughter plant. Rules enforced by the Occupational Safety and Health Administration (OSHA), also increase the cost of production by increasing the regulatory costs of employing labor.

Starting in 1999, all meat plants are required to have a plant that identifies the critical control points for meat safety to and identify specific action plans to insure food safety (Nuddell, p.67). This is sometimes referred to as HACCP. One aspect of HACCP is the fact that it requires up to 2 additional full-time equivalents in the plants payroll when fully operational. Since these employees have both inspection and supervisory roles, they earn a relatively high salary. This makes it difficult for a small scale plant to operate efficiently (Nuddell, p.67).

Environmental Regulation has been identified by industry participants as a major problem facing the feedlot industry. A major regulatory issue for feedlots is the fact that a feedlot with more than 1,000 slaughter and feeder cattle is considered a Concentrated Animal Feeding Operation (CAFO) (Gollehon et al, p.3).

Being considered a CAFO would among other things require a nutrient management plan and a Comprehensive Manure Management Plan for the facility. The government also requires feedlot of 1,000 or more animals to establish a lagoon system to retain runoff from the feedlot. The general permit requires a storage facility equal to 6 months worth of manure, although a feedlot can apply for a more flexible permit (Agriculture and Rural Communities Round Table Meeting). Mounds must also be constructed to give cattle a place to stand in wet weather (Duncan et al, p.9). Open sided pole barns may also be necessary to protect cattle (Duncan et al, p.10). This is particularly true if the producers calve in the fall as well as the spring. Given the state's climate and the potential for both

surface water and groundwater contamination, a good manure management program will be necessary for the feedlot.

The Environmental Protection Agency (EPA) defines an animal feeding operation (AFO) as a facility where:

- Animals have been or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period, and
- Crops, vegetation, forage growth, or post harvest residues are not sustained in the normal growing season over any portion of the lot or facility (Gollehon et al, p.3).

The primary federal act regulating manure management on feedlots is the Clean Water Act. Under the Clean Water Act, facilities that discharge directly into water resources through a ditch or pipe require a National Pollutant Discharge Elimination System (NPDES) permit. The permit specifies the level of treatment necessary before the discharge can enter into navigable waters (Gollehon et al, p.3). Permits are not necessary if the facility can contain runoff associated with a local 24 hour storm of a severity expected only once in 25 years (Gollehon et al, p.3). The Michigan Department of Environmental Quality (DEQ) requires a 100 feet setback to any down-gradient surface waters, open tile risers, sinkholes, agricultural wellheads, or grassed waterways, ditches an swales that are conduits to surface waters. A 35 feet filter strip can be substituted for the 100 feet setback (Agricultural and Rural Communities Roundtable Meeting).

Michigan farmers may also be subject to the provisions of the Coastal Zone Management Act. This requires that discharges from coastal CAFOs be limited through appropriate storage and an appropriate waste management system. CAFOs with a NPDES permit are exempt from these provisions (Gollehon et al, p.4). Michigan has the ability to issue its own NPDES permits (Gollehon et al, p.4).

Technical support to feedlot operators is available through the USDA, the Michigan Department of Agriculture and Michigan State University. An important consideration for a feedlot operation is proper disposal of manure. This will likely include transportation of manure from a feedlot to another location. One positive aspect about Northern Michigan is that the area probably has the ability to absorb the nutrients in manure.

As previously noted proper management of manure is important. Up to 90 percent of the nitrogen in manure can be lost through the air in the form of nitrogen gas or ammonia (Unterschultz and Jeffrey, p.5). Not only are nutrients lost but the gas is the source of an unpleasant smell and reduces the quality of the air. In order to reduce environmental impacts as well as reducing potential community opposition to a feedlot proper management of odor is very important. If a lagoon is used to capture manure the lagoon must be constructed at least 3 ft. above the bedrock and at least 2 ft. above the water table, and that feedlot and manure storage areas must be protected from surface running water during a major storm (Duncan et al, p.15). An issue for feedlots located in Northern Michigan is the potential of application when the ground is frozen. This may require larger manure storage facilities.

It should be noted that feedlot smaller than 1,000 animals may be exempt from some of these regulations. If the specialized market is small enough it may be to the feedlot owners' advantage to limit the size of the feedlot to less than 1,000 animals.

No matter what the regulatory environment, finding a supportive community is critical (Abdalla and Lawton, pp.178-179). The lack of public support for a feedlot or a processing facility could be fatal to a project. However, there appears to be several areas in Northern Michigan that would be amenable to a processing plant or a feedlot. There appears to be a strong interest in economic development and additional employment opportunities in this part of the state. This is a definite strength of this part of the state.

There are several other regulations that a feedlot comply with. Well sites need to be determined and approved. Set backs from existing housing also need to be determined. The site must be approved by the Michigan Department of Agriculture. Also, local building permits and inspections must be obtained.

Many in the beef industry believe that DEQ regulations make it difficult, if not impossible to construct a feedlot. As a result of the state's difficult budget situation permit fees have been increased which adds to the cost of operating a feedlot (Agriculture and Rural Communities Roundtable Meeting). One feedlot operator estimates that it could cost as much as $400 to $600 a head to build a manure storage facility that meets DEQ standards. Also, DEQ regulations are stricter than federal regulations, putting Michigan producers at a competitive disadvantage relative to other states. There is also a belief that DEQ regulations are not consistent, and that regulators are unwilling to certify facilities. If this is the case, a feedlot may not be technically feasible.

Summary of Technical Feasibility

Given the economies of scale in meat processing, the few number of animals in Northeast Michigan, and the degree of excess capacity, a processing plant is not technically feasible.

A feedlot is technically feasible, provided the regulatory environment is not too restrictive. If farmer or cooperative retains ownership and the marketing plan is dedicated to a niche market, the size of the feedlot should be no larger than the market the owners of the feedlot are interested in satisfying. However, it should be large enough to generate the interest of processors and other meat buyers. Careful consideration of environmental and regulatory factors as well as support or lack thereof from the local community should also be taken into account.

Another important issue for a feedlot is proper handling of manure. Composting and the use of methane digesters could be used to minimize the impact of manure generated by the feedlot. Failing that, the feedlot needs access to sufficient land area to spread the manure.

A feedlot needs to work closely with regulatory agencies, particularly the DEQ. Without DEQ approval, constructing a feedlot will be very difficult. If the regulatory environment is as bad as some in the industry believe it to be, then a new feedlot may not be feasible, especially in Northern Michigan.

Financial Feasibility

Capital Requirements

Capital requirements are quite large for both a processing facility and a feedlot. If farmer owned, commercial banks, the Farm Credit System and the CoBank are potential sources of credit. Compared to many other types of lending activities, obtaining a loan for a feedlot is relatively straightforward. The primary source of collateral for a feedlot is the animals themselves which can be easily liquidated at little cost to the lending institution.

Generally speaking, initial owner equity in the feedlot would be in the range of 40 to 50 percent (Duncan et al, p.21). Individual farmers may not possess the financial assets to invest this level of funds. If that is the case it may be necessary to find outside investors.

A beef cooperative in Northern Michigan believes that obtaining financing is a critical issue. This observation was made by several others during the course of this study. Obtaining additional funds from outside investors who may demand an equity position in the feedlot or processing plant may be necessary. However, if it is feasible financing could be made available for a feedlot or a processing plant.

Tax Relief

One way to address financing issues is through grants and other financial incentives such as tax relief. Agricultural Processing Renaissance Zones provide tax relief for a period of up to 15 years for processing facilities. This would probably not extend to a feedlot without some value added activity or other project such as an anaerobic digester that would generate outside interest. Depending on the level and type of investment a processing plant or feedlot could be eligible for investment tax credits which would reduce the tax burden faced by the facility.

Cash Flow Issues

A major issue in managing a feedlot is the wide fluctuations in returns to a feedlot. For example from 1981 to 1990, monthly returns to a yearling steer feeding program varied from a loss of $118 per head to a profit of $170 per head. Factors that cause this variability are changes in feed cost, feeder cattle prices, fed cattle prices and cattle performance (Langemeier, Schroeder and Mintert, p.41). It appears that variations in the cost of feed are a cause of the fluctuations in profitability (Anderson and Trapp, p.670). This is likely to become an even bigger issue with increase in ethanol production and the possible resultant increase in the price of corn. Analysis in Florida which has a beef industry similar to Michigan showed the same result (Prevatt et al, p.52). In order to

address this issue a feedlot operator either needs sufficient funds in reserve to cover the time periods a feedlot operates at a loss or develop alternative strategies. Managing risk is very important to insure the financial feasibility of a feedlot.

There are several ways to offset or minimize the potential loss of operating a feedlot. One way is to offer a specialized market that commands a price premium. This would directly enhance the total revenues of the feedlot; it would also mitigate the price fluctuations inherent in the cattle cycle. With the increasing output of ethanol facilities, high protein feed will become more available. Entering into an agreement with an ethanol plant for the DDGS could reduce the cost of feed for a feedlot while providing a ready market for the ethanol producer.

Locating the feedlot adjacent to an ethanol plant would allow for the feeding of wet distillers grain solubles (WDGS), this would eliminate the cost of drying the corn byproduct which would represent dramatic cost savings to the ethanol plant (Stearns et al, p.1) and provide inexpensive feed to the feedlot. A 1997 study indicates that WDGS prices are competitive with other feeds (Haugen and Hughes, p.iv). This is more likely to be the case now as more and more ethanol plants begin their operations and look for ways to market their byproducts. Locating a feedlot near an ethanol plant would enhance the profitability of operating the feedlot while simultaneously reducing the risk. The ethanol plant would benefit from having a ready market for their WDGS, without incurring the cost of drying the WDGS and finding a market for the DDGS.

Access to Capital

In addition to finding additional investors who are willing to provide funding for a feedlot or a processing plant loans will probably have to be entered into by the facility. Given the high quality of collateral in a feedlot (the animals in the feedlot) obtaining financing for a feedlot may not be difficult.

Finding financing for a processing plant will likely be more problematic. Assets in meat processing (saws, refrigeration units, etc.) tend to be very specific and are difficult to transfer to a different use. The excess capacity of meat processing in the state exacerbates this problem. Access to capital has been identified by some interested in starting a processing plant as being the single biggest barrier to starting a processing facility. However, the USDA does offer a loan guarantee program that might support bank's interest in loaning funds to a processor. One way to improve the financial feasibility of a processing plant is to obtain guarantees from producers that a sufficient number of animals will be delivered to the processing plant.

Ownership Structure

While vertical coordination is the norm in hog processing and is becoming more common in the lamb and beef industries, outright ownership is the exception in the beef industry. Far more common are marketing agreements, alliances, retained ownership, part-ownership and other arrangements (Muth et al, p.2-11). The level of risk and the capital

requirements generally preclude beef producers from owning processing plants. Ownership of feedlots is somewhat more common but still the exception rather than the rule. In order to minimize the financial risk and reduce the capital requirements some type of agreement with an existing processor, or firm interested in becoming a processor is the strategy most likely to be successful. An alternative is to custom process through an existing processor and retain ownership. In order for this to be successful, producers need to have an established outlet for their meat products.

One ownership structure is complete vertical integration by producers. This is a difficult strategy to carry out successfully. One example of vertical integration is the North American Bison Cooperative based in New Rockford North Dakota. In 2005 this cooperative had sales of $22 million and employed 147 people (Yahoo Finance). The cooperative operates its own slaughtering and processing facility and specializes in buffalo products from animals that are free of growth hormones, never fed antibiotics or animal byproducts (Yahoo Finance). However, despite having 50 percent of the bison market in the U.S., the firm declared Chapter 11 bankruptcy in 2004 and emerged from Chapter 11 in 2005 (Yahoo Finance). Finding markets and selling the product at prices that cover costs of production remains a challenge.

An example from the beef industry is U.S. Premium Beef. It began as a new generation or closed cooperative (Barton, p. 14). The membership was limited. This is also a vertically integrated producer owned processing firm. In 1997, U.S. Premium Beef entered into an agreement with Farmland National Beef Packing Company (uspb.com). U.S. Premium Beef had an initial cooperative stock offering that raised $38 million.

Joint ownership or similar arrangements are more common than outright ownership. The membership of U.S Premium beef is large enough to capture economies of scale the firm processed 8,100 head of cattle per week in 1997 through its two processing plants in Kansas (uspb.com). When Farmland declared bankruptcy U.S. Premium Beef and a minority partner purchased Farmland's share of the business (Barton, p.14).

U.S. Premium Beef with two minority owners eventually bought out Farmland Industries. U.S. Premium Beef has also converted its organizational structure from a cooperative to a Limited Liability Company (LLC). The rationale for the change in business structure is as follows:

- Better handling of increasing nonpatronage income
- Limitations on access to equity capital due to the reluctance of producers to invest
- The ability to maintain the current benefits of delivery including grid pricing and carcass data
- Greater growth earnings and market access potential
- Ability to better address the disconnect between member and patron investors and non-delivery problems
- Increase in share liquidity and value efficiency including the ability to convert retained equity, both allocated and unallocated, to tradeable stock shares

- Increased tax efficiency on income distribution as dividends instead of patronage refunds (Barton, p.15).

Producers from 36 states market their cattle through U.S. Premium Beef. The firm obtains cattle from feedlots in 7 states (uspb.com). U.S. Premium Beef also provides individual carcass data to its producers in an attempt to improve the quality of the animals processed (uspb.com). The U.S. Premium Beef example shows that a firm can change its ownership structure and level of investment over time to take advantage of a changing market.

Another business structure is the cooperative. In this case a cooperative is a firm that markets livestock for its farmer members. A cooperative operates in more than one stage of the marketing channel. Over time cooperatives have become more like investor owned organizations such as issuing stock to nonfarmers or by changing their business structure to become a LLC or a C corporation (Barton, p.3). Given the constraints on access to capital a cooperative interested in a processing facility or a feedlot may wish to either change its business structure or enter into an agreement with an existing firm. Internally generated capital financing from farmer members is often not sufficient to start a new business or expand into new markets.

All firms that begin a new business need to consider several important financial issues. Some of these issues include the following:

- Choice of solvency level: high to low
- Choice of allocated versus unallocated ownership: high to low
- Choice of high or low common stock level, where common stock is non-revolving
- Choice of using publicly listed equity, such as preferred stock
- Choice of balance sheet equity management and patron account equity management (applies only to cooperatives)
- Choice of business organization (Barton, p.4)

Generally, the tradeoff involves control of the decisions versus exposure to risk. The greater the risk, the more control over the decisions and the greater the potential to capture the profits. Conversely, the less the risk, the more input others (such as outside investors) have in decisionmaking and the wider the distribution of profits to lenders, outside investors etc.

Another issue facing the cattle industry in Northern Michigan is the small size of the farms. Of the 14,400 farms in the state with cattle and calves, more than 70 percent have between 1 and 49 animals. Only 90 farms in the state have more than 1,000 animals (Kleweno and Matthews, p.59). Some type of collective action or organization either through a cooperative, or other type of joint venture will be necessary to achieve sufficient numbers to meet the needs of even a niche market.

Some type of joint operating agreement between a feedlot and an existing processing facility could be of benefit to both the feedlot and the processing plant. In the commodity

market, feedlot operators must sell their animals to a concentrated processing industry that has a relatively fixed weekly capacity (Lawrence, Wang and Loy, p.349). Processors with excess capacity may be willing to process animals in order to reduce their costs. This could be the case whether or not the feedlot owner retains ownership of the carcasses or if the feedlot operator is supplying cattle to a niche market. The processor may also be better able to sell less desirable cuts such as roasts.

One way to gain market access with a minimum risk is to work with a branded beef processor or marketer. For example Niman Ranch and Laura's Lean Beef look for beef producers that meet their production methods. This can allow beef producers to obtain higher prices for their cattle with little of the capital costs that are incurred with a feedlot or processing facility.

Summary of Financial Feasibility

The preponderance of evidence indicates that a processing facility is not financially feasible. Studies show that a small processing facility does not generate enough cash to be sustainable. Finding capital for a processing facility will also be difficult. Possible processors lack the financial resources to build a facility. Without grants and other types of additional assistance, a processing facility will not be built. However, if a processing facility can find a buyer willing and able to commit to purchasing the products produced by a processing facility, and producers supply and sufficient number of animals on a year round basis the project could be feasible.

A feedlot is financially feasible. The animals at the feedlot provide excellent collateral for a lender. Despite this fact, it is unlikely that an individual producer would be able to operate a feedlot on their own. The costs are too high. Some type of corporate structure such as a cooperative or LLC will likely be necessary. This has the advantage of sharing the risk and reducing the initial capital investment by any one individual. As with the case of a processing facility, identifying partners such as a guaranteed buyer of the feedlot's animals would also enhance the financial feasibility of a feedlot.

Management Feasibility

Organizational Structure

Proper management of a facility is important in the success or failure of either a processing plant or a feedlot. Proper feeding is especially important to maximize weight gain and the health of the animals (Rahman, p.6). Processors value both quality (grade) and quantity (yield) of the carcass and will pay accordingly (Rahman, p.15). While there is the potential for additional profit for farmers that retain ownership of their cattle through the feedlot stage, operating a feedlot also adds additional risk to the producer. Good management is necessary to minimize that risk.

Table 10 shows the estimated salary requirements for a small processing plant. These figures include fringe benefits. It also assumes that the plant will operate at full capacity.

Again, to operate a full capacity a constant year round supply of animals will need to be available. If the plant does not operate at full capacity, hourly labor costs (primarily line workers and maintenance staff) would be reduced, however the overhead costs per animal would increase.

Table 10: Estimated Labor Costs of a Small Processing Plant

Position	Wages and Fringe Benefits
1 Manager	$75,000
1 Office Supervisor	18,750
1 Maintenance Manager	22,000
5 Line Workers	148,000
1 USDA Inspector	37,500
1 HACCP Compliance	32,500
Total	$333,750

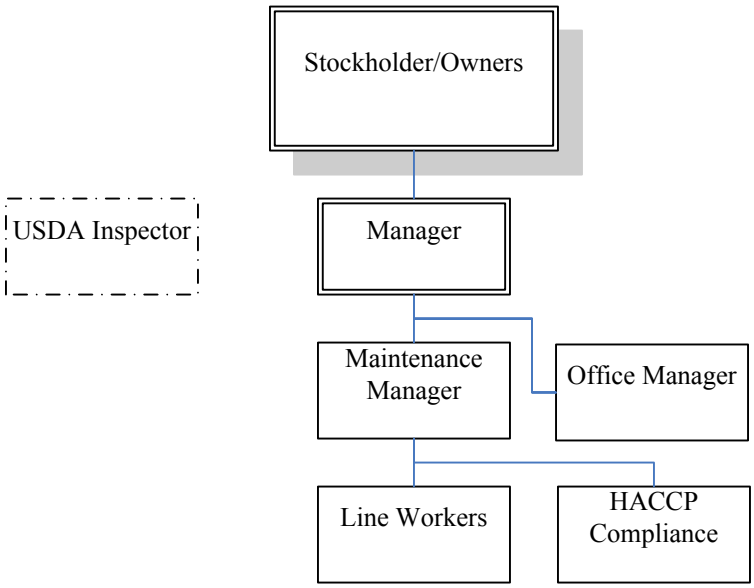
Source: Derived from Nuddell et al

These figures should be considered estimates, but does show that labor costs for even a small facility will like this could be well in excess of $300,000. Total employment in a plant of this size is 10 including the inspector. It is assumed that there is no public subsidy of the inspector. Given the current budget situation facing the state, it is unlikely that support for a meat inspector will be available from public funds.

A small processing plant of this size is not a major job producer although a few additional jobs will be created by the additional economic activity generated by the processing plant. A processing plant is not likely to disrupt local job markets and may provide a source of employment for local unskilled workers especially for line workers. It should be noted that turnover in processing plants is very high, sometimes in excess of 100 percent per year (Duncan et al, p.30). Additional workers will likely be needed over time. One advantage of a plant of such a small size is that it is less likely to meet with local opposition.

Figure 3 outlines the organizational structure of a processing plant.

Figure 3: The Organizational Structure of a Small Scale Processing Plant



These employees will undertake a variety of activities. For example the office supervisor would function as the receptionist and bookkeeper, process payroll, generate the billings and answer the phone. The maintenance manager would be responsible for keeping the building and equipment in good repair as well as disposing of the offal and cleaning the plant every day. It is also estimated that manager, maintenance manager and office supervisor would also aid in HACCP compliance along with the dedicated HACCP employee (Nuddell et al, p. 74). While the USDA inspector salary is paid for by the processing plant, the inspector is independent of the processing plant's chain of command.

Table 11 shows the labor costs for a 1,000 head and 5,000 head feedlot. These costs also include salary and fringe benefits.

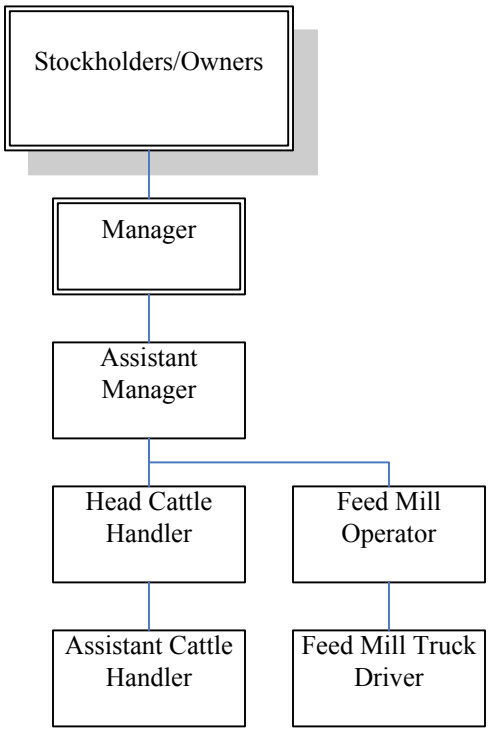
Table 11: Estimated Labor Requirements for a 1,000 and 5,000 Head Feedlot				
	1,000 Head Feedlot		**5,000 Head Feedlot**	
Manager	$	51,700	$	103,000
Assistant Manager		25,100		25,100
Head Cattle Handler				38,400
Asisstant Cattle Handler		25,100		25,100
Feed Mill Operator				38,400
Feed Mill Truck Driver				25,100
Total Employees		3		6
Total Cost	**$**	**101,900**	**$**	**255,100**
Cost Per Head		**102**		**51**

Source: Duncan et al

As is the case with capital costs there are significant economies of scale with a larger feedlot. The per head labor costs of a 5,000 head feedlot is half as much as a 1,000 head feedlot. Also, labor is specialized in the larger feedlot. A 1,000 head feedlot requires the assistant manager to aid in cattle handling and feed operations.

Figure 4 outlines the organizational structure of a feedlot. It should be noted that this figure is for a 5,000 head feedlot. A 1,000 head feedlot would not need a head cattle handler, a feed mill operator or a feed mill truck driver, which would simplify the management structure of the feedlot.

Figure 4: Organizational Structure of a 5,000 Head Feedlot



The manager will also be responsible for day to day financial management of the feedlot. The employment impacts of a feedlot are relatively small with 3 jobs in a 1,000 head feedlot and 6 jobs in a 5,000 head feedlot. There will be a few additional jobs generated by the economic activity generated by the feedlot, but it is not likely enough to disrupt local job markets.

Qualifications and Necessary Skills of the Management Team

If possible a processing plant or a feedlot should try to hire an experienced manager. Managers oversee the entire operation. Their duties include conducting business with creditors, customers, and the board of directors. Duties also include selling the final product and buying inputs as well as managing employees and insuring the processing plant or feedlot meets environmental standards (Duncan, p.17). It may be difficult to obtain a qualified manager from the local labor force, a statewide or even nationwide search may be necessary.

A processing plant or feedlot also requires an assistant manager. The assistant manager duties would include the day to day operation of the facility and managing cattle, maintenance of the facility and in the case of the feedlot, managing feed rations.

Business Structure

Several possible business structures are possible for a feedlot or a processing plant. Given the capital costs of these facilities it is extremely unlikely that an individual will be

able to own a processing plant or a feedlot outright. Cooperatives would allow farmers to work together to obtain sufficient funding to carry out the project. However, given the size of most of the farmers in the area, even a cooperative may be underfunded. A limited liability company (LLC) comprised of both farmers and outside investors is a business structure that could generate enough funds to start a processing plant or a feedlot.

It is not likely that an individual would be able to successfully fund and manage either a feedlot or a processing plant. Some type of corporate structure such as a cooperative or LLC will likely be necessary. This does have the added advantage of reducing the overall risk to an individual investor.

Summary of Management Feasibility

A feedlot and a small processing facility are both feasible from a management perspective. Given the few number of employees used by these operations, the personnel management requirements are not excessive. To insure success it is important to hire a manager to oversee day to day operations that has experience in either the feedlot industry or the processing industry.

Corporate structure is also important. A cooperative, LLC or other corporate structure would reduce the level of risk and allow the members or stockholders to share in ultimate management responsibilities. A sole proprietorship would likely lack both the executive background and the financial means necessary to support either a processing facility or a feedlot.

Conclusion and Recommendations

Processing Facility

A processing facility does not appear to be feasible at this point in time. The fundamental reason is that this part of the state lacks a sufficient number of animals to support a processing plant. Reinforcing this problem is the seasonality of animal production which makes it difficult for a processor to obtain a year round supply of animals. Without additional animals a processing plant will not be built and without access to processing it is difficult to expand animal production in this part of the state.

A processing facility does not appear to be feasible from an economic or technical point of view. Given the financial situation of producers and others in the industry, a processing plant does not appear to be feasible from a financial point of view either. Loan guarantees, grants, and other means of support are necessary for a processing plant to be financially feasible. Internal resources are not likely to be sufficient for a processing plant to be financially feasible.

From a marketing perspective a processing plant that focuses on sheep or goats is feasible. This is primarily due to the large and growing Muslim population in Michigan.

However, in order to gain access to this market, the animals must be slaughtered and processed in accordance to Islamic regulations. Also, the plant needs a steady year round supply of animals with the potential to increase production during Ramadan. Without access to more animals this market potential will not be achieved.

A beef processing plant is probably not feasible from a marketing perspective. This is due to two primary reasons. The first is the level of excess capacity of beef production in the state. Adding additional capacity is not likely to be efficient. Another major drawback to a beef processing facility is the difficulty of finding a market for the entire carcass. Finding a market for steaks and ground beef is relatively easy, finding a market for roasts and other cuts is difficult, and finding a market for organs, hides and other beef products is extremely difficult. The smaller the processing plant the greater these challenges become.

From a management perspective a processing plant is feasible. The size of the facilities considered and the amount of labor used are not excessive. An ownership structure of a cooperative or a LLC is the most feasible. An ownership structure of one entrepreneur is less likely to be successful.

Feedlot

A feedlot is feasible from an economic, marketing, financial, technical and managerial perspective. However, a feedlot located in Northern Lower Michigan is not recommended. The primary reason it is not recommended is that the feed costs of locating a facility in that part of the state is too high relative to feed costs in other parts of the state. The growth of the ethanol industry will only make this cost disadvantage worse. Another issue facing a feedlot in this part of the state is proper manure management. If the feedlot determines that land application is the preferred method of manure management finding a sufficient land area to spread the manure may be difficult.

One way to minimize costs and also providing a benefit to an ethanol plant is to locate a feedlot near an ethanol plant or enter into an agreement with an ethanol plant for the use of WDGS. This would provide a good feed source to the feedlot while reducing the operating costs of the ethanol plant. This would require the feedlot to be located in the middle or southern part of the state. Locating in this part of the state also has the benefit of being closer to larger processing firms.

There are several possible marketing strategies that could be successful. One strategy that perhaps shows the most promise is to enter into an agreement with a processor and marketer of specialty beef products. This would allow the owners of the feedlot to obtain a higher price for their animals without having to take on additional marketing activities. However, the owners of the feedlot would have to meet the production standards of the processor. Retained ownership through an agreement with an existing processor also holds some promise but also increases the risk. Marketing the entire carcass may also be an issue although less of an issue than operating a processing plant. Another option is direct sales of the animals which would require the consumer or the feedlot working with

the consumer to arrange the slaughter and processing of the animal. This has potential for a small number of animals, but is not likely to be a strategy that a large number of producers will be able to utilize.

Provided the regulatory environment is not too restrictive and a good manure management program can be implemented at a reasonable cost, a feedlot is technically feasible. Given the strong collateral of the cattle in a feedlot, the feedlot is also likely to be financially feasible. There is sufficient managerial capacity for a feedlot to be feasible as well. In conclusion, a feedlot that forms a strategic alliance with another firm in the beef industry has a good chance of being successful. As is the case with a processing plant, a feedlot owned by a cooperative or a LLC would also have an improved chance of success.

References

Abdalla, C. and J. Lawton. *Environmental Issues in Animal Agriculture*, Choices, 3rd Quarter 2006, 21 (3) (177-181).

Abidoye, B. and J. Lawerence. *Value of Single Source and Backgrounded Cattle as Measured by Health and Feedlot Profitability*. Presented at the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, 2002.

Agriculture and Rural Communities Roundtable Meeting. March 16, 2006, Frankenmuth Michigan. www.michigan.gov/deq.

Anderson, J. and J. Trapp. *Corn Price Effects on Cost of Gain for Feedlot Cattle: Implications for Breakeven Budgeting*, Journal of Agricultural and Resource Economics 25 (2), 2000, (4469-679).

Barton, D. *A Comparison of Traditional and Newly Emerging Forms of Cooperative Capitalization*. Manhattan: Kansas State University, Arthur Capper Cooperative Center, 2004.

Boehlje, M. *Economics of Animal Agriculture Production, Processing and Marketing,* Choices, 3rd Quarter 2006, 21 (3), (159-162).

Carriquiry, M. *Guaranteed Tender Beef: Opportunities and Challenges for a Differentiated Agricultural Product*, Working Paper 04-WP 371. Ames: Iowa State University, Center for Agriculture and Rural Development, 2004.

Duncan, M., R. D. Taylor, D. Saxowsky and W. Koo. *Economic Feasibility of the Cattle Feeding Industry in the Northern Plains and Western Lake States*, Agricultural Economics Report No. 370. Fargo: North Dakota State University Department of Agricultural Economics, 1997.

Ensminger, M., and R. Perry. Beef Cattle Science, Seventh Edition. Danville: Interstate Publishers, Inc., 1997.

Forristall, C., G. May and J. Lawrence. *Assessing the Cost of Beef Quality*. Presented at the NCR-134 Conference on Applied Commodity Price Analysis Forecasting and Market Risk Management, 2002.

Goldsmith, P. and P. Martin. *Community and Labor Issues in Animal Agriculture*, Choices, 3rd Quarter 2006 21 (3) (183-187).

Gollehon, N., M. Caswell, M. Ribaudo, R. Kellogg, C. Lander, and D. Letson. *Confined Animal Production and Manure Nutrients*, Agriculture Information Bulletin N. 771. Washington: U.S. Department of Agriculture, Economic Research Service, 2001.

Haugen, R. and H. Hughes. *Economic Evaluation of Wet Corn Gluten Feed in Beef Feedlot Finishing*, Agricultural Economics Miscellaneous Report No. 180. Fargo: North Dakota State University, Department of Agricultural Economics – Agricultural Experiment Station, 1997.

Halbrook, S., W. Armbruster, and M. Thompson. *The Future of Animal Agriculture in North America,* Choices, 3rd Quarter 2006, 21(3), (155-157).

http://www.laurasleanbeefcattle.com

Ingram, R. and D. Macon. *Feasibility Studies and Business Plans*, Presented at Niche Markets for Meat Products Short Course University of California, Davis, 2003.

Jensen, H. *Consumer Issues and Demand*, Choices, 3rd Quarter 2006, 21(3), (165-169).

Jensen, H., L. Unnevehr, and M. Gomez. *The Cost of Improving Food Safety in the Meat Sector,* Working Paper 98-WP 198. Ames: Iowa State University, Center for Agricultural and Rural Development, 1998.

Johnson, S. (Johnson a). *Packing House Byproducts*. Ames: Iowa State University, Agricultural Marketing Resource Center, 2003.

Johnson, S. (Johnson b). *U.S. Beef Packing Industry*. Ames: Iowa State University, Agricultural Marketing Resource Center, 2003.

Kleweno, D. and V. Matthews. *Michigan Agricultural Statistics 2005-2006.* Lansing: Michigan Department of Agriculture, 2006.

Knudson, W. *Market Opportunity for Meat Goats*, The Strategic Marketing Institute Working Paper, No. 2-0106. East Lansing: Michigan State University, Product Center for Agriculture and Natural Resources.

Langemeier, M., T. Schroeder, and J. Mintert. *Determinants of Cattle Finishing Profitability*, Southern Journal of Agricultural Economics, December 1992 (41-47).

Larson, A. and E. Thompson. *Direct Marketing of Lamb to Niche and Ethnic Markets.* Champaign: University of Illinois Extension.

Lawrence, J., Z. Wang, and D. Loy. *Elements of Cattle Feeding Profitability in Midwest Feedlots,* Journal of Agricultural and Applied Economics 31, 2, August 1999 (349-357).

Lence, S. *A Comparative Marketing Analysis of Major Agricultural Products in the United States and Argentina, Argentina Report 2*, MATRIC Research Paper 00-MRP 2. Ames: Iowa State University, Midwest Agribusiness Trade Research and Information Center, 2000.

Leopold Center for Sustainable Agriculture (Leopold Center). *Supporting Direct Meat Marketing in Iowa*, 2006.

MacMillan, D. *Turkey Farmers Build a Better Bird*. BusinessWeek.com, Nov. 21, 2006. http://www.businessweek.com/smallbiz/content/nov2006.

Michigan Complied Laws. http://www.legislature.mi.gov.

Michigan Railroads Association. *Michigan's Rail System.*

Mintel. *Red Meat*. Chicago: Mintel International Group Ltd., 2004.

Morrison, E. *A Market for Meat Goats?* Ag Innovation News, Oct. 2000, Vol. 9, No. 3. http://www.auri.org/news/ainoct00/07goat.htm.

Murphy, R., A. Schupp and J. Lee. *Economic Feasibility of Specialized Beef Processing in Louisiana*, Journal of Food Distribution Research, June 1990 (31-37).

Muth, M.K., G. Brester, J. Del Roccili, S. Koontz, B. Martin, N. Piggott, J. Taylor, T. Vukina, M. Wohlgenant. *Spot and Alternative Marketing Arrangements in the Livestock and Meat Industries*, Interim Report. Prepared for the Grain Inspection, Packers, and Stockyards Administration, 2005.

Nickel, F. *Bringing it Home: Dakota Prairie Beef Co-op Adding Value to Home-Grown Cattle, Grains*, Rural Cooperative Magazine, Nov.-Dec. 2002. http://www.rurdev.usda.gov/rbs/pub/nov02/home.html.

Niman Ranch. *Our Cattle Protocol.*

Nudell, D., D. Draenzel, T. Petry, T. Faller, H. Hughes, and E. Brown. *A Preliminary Feasibility for Establishing a Multi-Species Meat Processing Plant in Southwestern North Dakota,* Agricultural Economics Report No. 418. Fargo: North Dakota State University – The Institute of Natural Resources and Economic Development, 1999.

Osborne, C. and J. Bingen. *Michigan Organic and Community Farmer Roundtables: Summary Report & Recommendations*. Michigan Organic Food and Farm Alliance, 2003.

Prevatt, J., B. Melton, T. Spreen and W. Mathis. *The Economics of Carcass Beef Production: An Appraisal of Florida's Feedlot Potential*, Southern Journal of Agricultural Economics, December 1978 (49-55).

Rahman, S. *Optimal Incentive Structure in Cattle Feeding Contracts Under Alternative Fed Cattle Pricing Methods*, paper presented at the American Agricultural Economics Association Annual Meeting, 2006.

Rust, S. and R. Black. *Use of Distillers Grains in Growing-Finishing Cattle Rations.* Michigan State University, The Distillers Grains Inservice, December, 2006.

Stearns, L., R. Sell, D. Watt, V. Anderson. *Economics of Establishing a Beef Cattle Feedlot Using By-Products of Ethanol Production in North Dakota,* Agricultural Economics Report No. 299. Fargo: North Dakota State University Department of Agricultural Economics – Agricultural Experiment Station, 1993.

Tostao, E. and C. Chung. *Horizontal Consolidation in the U.S. Food Processing Industry: Boon or Bane?*

Tyson. *Live Production: Beef.* http://www.tyson.com

U.S. Department of Agriculture. *Changes in the U.S. Feedlot Industry: 1994-199.* Fort Collins: U.S. Department of Agriculture, Animal and Plant Health Inspection Service: Veterinary Service, CEAH, National Animal Health Monitoring System, #N327, 0800, 2000.

uspb.com. http://www.uspb.com/USPBHistory.asp.

Unterschultz, J. and S. Jeffrey. *Economic Evaluation of Manure Management and Farm Gate Applications: A Literature Review of Environmental and Economic Aspects of Manure Management in Alberta's Livestock Sectors*, Rural Economy Project Report No. 01-03. Edmonton: University of Alberta, Department of Rural Economy, 2001.

Wachenheim, C., P. Novak, E. DeVuyst, and D. Lambert. *Demand Estimation for Agricultural Processing Co-products*, Agribusiness and Applied Economics Report, No. 453. Fargo: North Dakota State University, Department of Agribusiness and Applied Economics, 2001.

Ward, C. *Factors Influencing the Extent of Grid Pricing of Fed Cattle,* Paper Presented at the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, 2005.

White, B., and J. Anderson. *Factor Price Disparity in the Feeder Cattle Market and Retained Ownership Decision Making: An Application of Farm-Level Feed-Out Data,* paper presented at the American Agricultural Economics Association Annual Meeting, 2005.

Yahoo Finance. *North American Bison Cooperative Company Profile*, http://biz.yahoo.com/ic/111/111863.html.