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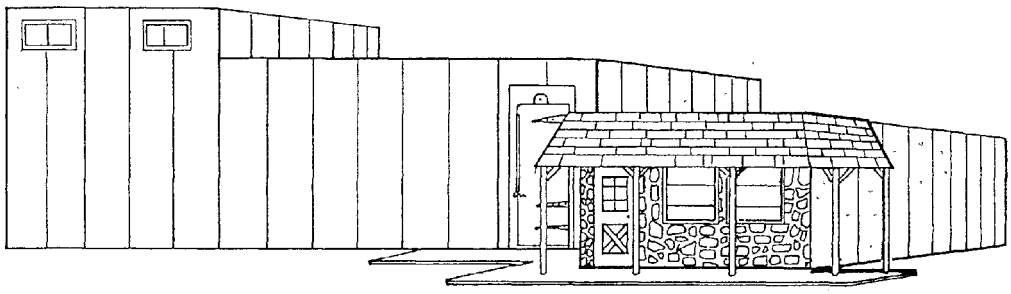
FEASIBILITY OF OPERATING A LAMB SLAUGHTER PLANT IN NORTH DAKOTA



A Report To Valley Wool Growers

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The authors accept sole responsibility for any errors or omissions.

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ABSTRACT

A group of North Dakota lamb producers who are members of Valley Wool Growers Association identified several niche markets for high quality North Dakota lambs. The potential availability of a closed, but formerly federally inspected, livestock slaughter and meat processing facility in Steele County heightened their interest in determining the feasibility of a cooperatively owned lamb slaughter and processing facility. The cooperative would be patterned after existing and proposed slaughter cooperatives, whereby cooperative members would own shares to supply lambs to the plant on a year-round basis.

The analysis was conducted in several sections corresponding to critical factors which affect feasibility of the plant. The critical factors analyzed included federal inspection requirements, the potential of an adequate supply of lambs, the potential for a viable niche market, plant investment and operating costs, expected return, alternative lamb purchase prices, alternative lamb carcass sales prices, and several investment and expense scenarios.

The building and equipment investment was projected to be $1,468,000, which was higher than originally expected due to the extensive refurbishing necessary to meet federal inspection and increased capacity requirements. Plant operating expenses at full capacity were projected to be $3,013,877 per year which included $673,877 in operating expenses and $2,340,000 for lamb purchase. Income from lamb meat sales and pelts was estimated at $2,800,000 per year.

The assumptions of purchasing 20,000 lambs per year for $0.90 per pound and selling for $2 per carcass pound resulted in an annual negative margin of $213,877 at full capacity. Therefore, other scenarios were investigated which would enable the plant to operate profitably. The maximum price that could be paid for lambs to pay all investment and operating costs, including a 7.5 percent return to member equity, was $0.8004 per pound. A 25 percent increase in projected costs would reduce the purchase price to $0.7358, or a reduction in the lamb carcass sales price to $1.80 per pound would reduce the lamb purchase price to $0.7004.

The range in probable prices that could be paid for lambs is $0.70 to $0.80 per pound with a likely price of $0.75. The proposers of the cooperative will need to decide if prices in this range would be sufficient to lure enough member investors to provide the 20,000 lambs necessary to operate the plant.

Key Words: lambs, slaughter, processing, niche market, lamb prices, lamb carcass prices, feasibility, cooperative, federal meat inspection, plant operating expenses.

HIGHLIGHTS

A group of North Dakota lamb producers who are members of Valley Wool Growers Association identified several niche markets for high quality North Dakota lambs. The potential availability of a closed, but formerly federally inspected, livestock slaughter and meat processing facility in Steele County heightened their interest in determining the feasibility of a cooperatively owned lamb slaughter and processing facility. The cooperative would be patterned after existing and proposed slaughter cooperatives, whereby cooperative members would own shares to supply lambs to the plant on a year-round basis.

The analysis was conducted in several sections corresponding to critical factors which affect feasibility of the plant. The critical factors analyzed included federal inspection requirements, the potential of an adequate supply of lambs, the potential for a viable niche market, plant investment and operating costs, expected return, alternative lamb purchase prices, alternative lamb carcass sales prices, and several investment and expense scenarios.

Current sheep numbers in North Dakota and the region, coupled with new technology in year-round lamb production indicate that enough lambs could be available to meet the 20,000 head per year needed by the plant. Producers of the cooperative identified several confidential niche markets for high quality North Dakota produced lambs. Some examples include marketing to ethnic and religious groups in more urban markets and production of hothouse lambs for that market. A premium price for the product can be expected because it meets the specifications of unique consumer groups.

The building and equipment investment was projected to be $1,468,000, which was higher than originally expected due to the extensive refurbishing necessary to meet federal inspection and increased capacity requirements. Plant operating expenses at full capacity were projected to be $3,013,877 per year which included $673,877 in operating expenses and $2,340,000 for lamb purchase. Income from lamb meat sales and pelts was estimated at $2,800,000 per year.

The assumptions of purchasing lambs for $0.90 per pound and selling the meat for $2 per carcass pound resulted in an annual negative margin of $213,877 at full capacity. Therefore, other scenarios were investigated which would enable the plant to operate profitably. The maximum price that could be paid for lambs to pay all investment and operating costs, including a 7.5 percent return to member equity, was $0.8004 per pound. A 25 percent increase in projected costs would reduce the purchase price to $0.7358, or a reduction in the lamb carcass sales price to $1.80 per pound would reduce the lamb purchase price to $0.7004. The range in probable prices that could be paid for lambs is $0.70 to $0.80 with a likely price of $0.75. The proposers of the cooperative will need to decide if prices in this range would be sufficient to lure enough member investors to provide the 20,000 lambs necessary to operate the plant. The idea to add value to locally produced lambs and provide product to a niche market is certainly a good one. It should not be lost even if the purchase prices are considered too low to generate sufficient interest. A viable niche market for high quality, specialty lamb products does exist; so producers

may want to pursue slaughtering lambs on a custom basis in an existing slaughter facility. This would eliminate the initial investment costs in buildings and equipment and enable producers to concentrate on producing and marketing a high quality product. It would allow starting on a smaller scale with fewer lambs per year.

FEASIBILITY OF OPERATING A LAMB SLAUGHTER PLANT IN NORTH DAKOTA

Dan Nudell and Tim Petry[1]

INTRODUCTION

The production and sale of livestock and livestock products are important sources of income for North Dakota agricultural producers. Cash receipts from livestock and products typically amount to 20 to 30 percent of North Dakota farm income. In some counties, cash receipts from livestock are quite important and amount to three-fourths of total farm income (NASS, 1997).

There were 135,000 sheep and lambs on 1000 North Dakota farms and ranches on January 1, 1997. Sales of sheep and lambs generated approximately $6,978,000 in 1996 with sales of wool generating about $676,000 (NASS, 1997).

The North Dakota livestock slaughtering and processing industry is composed primarily of relatively small facilities that serve local communities. A medium-sized (by industry standards) cow slaughter and processing facility, a medium-sized hog slaughter and processing plant, and a bison slaughter and processing facility do exist. A group of cattle producers is promoting a cooperatively owned medium-sized market cattle slaughter and processing plant which could be located in North Dakota. Slaughtering and processing lambs occurs in several small plants in North Dakota amounting to less than 500 head per year.

Rural economic development has emerged as a high priority public policy issue in North Dakota. Policymakers have set goals to increase value-added livestock enterprises in the state to increase economic activity. Each dollar received for livestock in North Dakota generates approximately $4.49 in increased economic activity due to the multiplier effect, so expanding livestock production is an economic development endeavor with high potential.

The lack of a major lamb slaughtering facility in or near North Dakota means that many lambs must be transported several hundred miles for marketing. Declining sheep numbers nationwide and increased concentration in lamb processing have resulted in only a few large lamb slaughter plants. These large plants are not necessarily responsive to the unique needs of niche markets which are developing for lamb.

A group of North Dakota lamb producers identified several niche markets for high-quality North Dakota lambs. The potential availability of an existing federally inspected livestock slaughter and meat processing facility in Steele County heightened their interest in determining the feasibility of a cooperatively owned lamb slaughter and processing facility. The cooperative would likely be patterned after existing and proposed livestock slaughter cooperatives, whereby cooperative members would own shares to supply lambs to the plant on a year-round basis.

The proposed plant would slaughter and process 20,000 lambs per year. Although this plant is

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small by industry standards, there are several advantages for a plant of this size. The plant would process lambs for small niche markets with unique requirements that large plants cannot satisfy. Generally, these markets are willing to pay higher prices and are more interested in quality, specifications, and service rather than quantity. Furthermore, the plant would not be in direct competition with larger major packers because of the unique market that would be served. A steady dependable market for lambs would be available in eastern North Dakota, which would help to stabilize an industry which has been declining. Several new jobs would result.

In April 1996, Valley Wool Growers Cooperative applied to the Agricultural Products Utilization Commission in North Dakota for a grant to cover the cost of a feasibility study of the proposed plant in Hope. Funding was granted, and this report is the result of that work.

The analysis was conducted in several sections corresponding to critical factors which affect feasibility of the plant. If analysis shows any of these factors to be unsatisfactory, the plant would not be feasible and the feasibility analysis could stop at that point. The critical factors analyzed by sector include federal inspection requirements, the potential for an adequate supply of lambs, the potential for a viable niche market, plant investment and operating costs, and the expected returns.

THE WHOLESOME MEAT ACT

Livestock slaughter plants operate under meat inspection regulations administered by the United States Department of Agriculture, Food Safety and Inspection Service (USDA, FSIS). Regulation began in 1891 when a comprehensive federal meat inspection law was passed. The 1891 legislation provided for inspecting the animal prior to slaughter and the meat after slaughter.

The 1891 legislation was extended in 1906 to include sanitation standards for slaughtering and processing plants trading in interstate commerce. This legislation was the basis of all meat inspection until the passage of the Wholesome Meat Act of 1967, which extended the requirements for inspection to plants that only sold meat within the state of operation.

The 1967 legislation gave individual states until 1969 to establish state inspection of processing plants that were not previously federally inspected. North Dakota passed a state inspection bill but did not allocate funds to initiate the program. Consequently, in 1970, federal inspection was initiated in North Dakota.

The 1967 Wholesome Meat Act has been modified several times. The regulations, designed to insure a safe and wholesome supply of meat, govern the operation of all slaughter plants which retail or wholesale meat products. Some exemptions to the act were made for small local plants. Custom-exempt plants may slaughter and process meat for the livestock owner and are inspected only quarterly. The meat cannot be sold to other customers. Retail exempt plants, such as grocery stores, may cut, process, and retail meat that has been purchased from a federally inspected plant.

The USDA is implementing a new series of regulations for meat slaughter plants and processors called HACCP, which stands for Hazards Analysis Critical Control Points. The intent of the

regulation is to identify potential problem areas in food safety and implement standard plant practices to insure a wholesome meat supply. The regulation has a staggered implementation scheme with the largest plants being required to meet the new guidelines first. By 1999, all plants must meet the new guidelines. The proposed plant would be required to meet the new regulation by 1999.

The HACCP regulation will require each plant to develop a plan to identify the critical control points for meat safety critical points and develop specific action plans to insure food safety. These plans may include employee monitoring of certain processes, enhanced record keeping or even laboratory testing of products and process.

HACCP is estimated to require up to two (2) additional full-time equivalents in payroll when fully operational and approved by USDA. Since these employees will have an inspection/supervisory capacity and, consequently, will be near the top of the pay scale at the Hope plant, this will have a substantial impact on the plant's operating costs.

The proposed plant will market all or nearly all of its product to wholesale and retail customers. None of the exemptions provided in the Wholesome Meat Act for custom-exempt and retail-exempt plants will provide any relief from the regulations of the act. Compliance with the requirements of federal inspection are expensive, but are mandated by law. Furthermore, the liability risk of selling an unsafe product is extremely high. The cost of meeting the requirements of the Wholesome Meat Act and the HACCP regulations will significantly impact the cost of doing business in the proposed slaughter plant.

Dr. Robert Anderson, supervising veterinary medical officer, FSIS, USDA, toured the existing plant with the authors and sheep producer members of the proposed lamb packing plant cooperative. He identified potential problem areas in the existing facility, and concluded that the plant should be renovated to a "like new" status before it would be approved for reopening under federal inspection. The proposed cooperative would need to submit a request for federal inspection, including blueprints and all anticipated building and equipment requirements for approval.

SUMMARY

Since federal inspection is mandated by law, the USDA is obligated to provide inspection to a plant that meets their specifications. Therefore, if the plant was renovated to a "like new" status and approved, federal inspection requirements would not prevent the plant from being operational.

NORTH DAKOTA LAMB SUPPLY

A major assumption of this study is that the cooperative will be successful in recruiting sufficient lamb producer members to supply 80 lambs each processing day throughout the year. The supply of lambs to operate a slaughter plant is one of the critical factors investors must verify prior to investing in the facility. In the tight margin industry of meat packing, the inability to operate

facilities at full capacity can have a serious negative effect on the plant's profitability. A large portion of the financial obligation of the plant is in fixed costs: the physical structure of the building and equipment. While variable costs, such as utilities and labor, can be reduced during periods of lamb shortages, the cost of the capital investment does not change during periods of reduced use. Ensuring a steady supply of lambs is critical for success.

The total supply of lambs in North Dakota is sufficient to supply a plant of this size with all the product needed to run at full capacity. In 1996, North Dakota sheep producers marketed 80,000 lambs from 77,000 ewes (USDA, 1997). The inventory of ewes in 1997 rose to 91,000, so more than 90,000 head of lambs may be marketed in 1997, depending on the number of ewe lambs retained for flock expansion. Also, Minnesota and South Dakota producers will be invited to join the cooperative which will expand the availability of lambs.

The geographic distribution of lamb production in North Dakota would be a concern for the plant. USDA data for 1997 indicate that 22 percent of the North Dakota sheep inventory is in the eastern one-third of the state, 31 percent is in the central one-third and 47 percent is in the western one-third. Therefore, recruiting cooperative members from western North Dakota would be important, or members in eastern North Dakota would need to purchase and feed additional feeder lambs to supply the plant's needs.

Two supply related concerns need to be addressed: the seasonality in lamb production and the practice of selling feeder lambs instead of slaughter weight lambs in North Dakota.

Due to the reproductive biology of sheep, lamb production has been characterized by seasonal production patterns. The weekly U.S. federally inspected lamb slaughter for 1996 ranged from a high of 102,500 head at the end of March to a low of 52,800 in the first week of July. Higher slaughter occurs before the spring religious holidays and is lower during the mid-summer between the spring and fall lamb crops. Weekly sales data for North Dakota are not available, but data from West Fargo Stockyards indicate that in only 5 weeks of the year did the market receive enough lambs to meet the needs of the plant and could meet 75 % of the need in only 12 weeks. In addition the range of supply was 0 to over 800 head per week. In 16 weeks, the available supply was less than 50 head.

Since the plant has a maximum capacity inherent in its design, shortfalls in production cannot be made up in a following period without adding extra shifts. A rural plant is not expected to have available trained labor that can fill extra shifts on short notice. Weeks where full production is not achieved will adversely affect the profitability of the plant.

The technology exists today to provide a more stable year-round supply of lambs. Traditional lambing time has been in the spring. Sheep are seasonal breeders and, if left to their own devices, would always lamb in the spring. Technologies are available using hormones, light or the ewe's natural responses to lengthen the time she is reproductively active. All these methods increase the amount of management input needed by the sheep flock and have not been widely accepted in the industry.

Researchers at North Dakota State University at Hettinger have had good success in getting ewes

to lamb in August, September, and October, using the ewes' response to rams and selection to choose replacement females from fall lambing ewes. The lambing and conception rates are not as high as spring lambing, but are high enough to be feasible.

South Dakota State University has done extensive work with light control and has used hormone control to extend the lambing season. Their work confirms the ability to extend lambing to non-traditional times. Extending lambing into the fall is more labor intensive than spring lambing.

The operators of the plant will have to overcome traditional production practices and competition for resources during non-traditional times of lamb production. Other farm enterprises may compete for available resources in non-traditional lambing flocks.

Based on official USDA saleable receipts at the West Fargo Stockyards in eastern North Dakota and lambs marketed by producers enrolled in the North Dakota Sheep Development Project in western North Dakota, it was estimated that less than 40 percent of the lambs marketed in the state were slaughter weight. The remaining 60 percent were feeder lambs weighing from 50 to 110 pounds. The cooperative would need high quality slaughter lambs with a consistent weight and grade. An educational program would be necessary to inform members of the additional feeding requirements necessary to meet the weight and quality goals of the cooperative.

It will be very important that the plant manager monitor the progress of the lambs committed by members to assure production would remain on schedule. In the event that members could not meet quality and quantity commitments of the contract, lambs may have to be purchased from livestock markets. Five markets are within a 100-mile radius of Hope, with West Fargo Stockyards being the largest seller of lambs. Purchasing lambs at the necessary weights and grades during the summer at these markets may be difficult.

Existing slaughter plants are offering or exploring the option of offering contracts to producers to ensure their supply. The lamb industry has been experiencing good prices and a tight supply. The supply side is not expected to change. A continuing tight supply of lambs would indicate that existing buyers probably will compete strongly for the available supply. Reaction to a new market entrant from existing slaughter lamb buyers at markets is a possibility that must be considered.

SUMMARY

Sheep numbers in North Dakota and the region coupled with new technology in year-round lamb production indicate that enough lambs could be available to meet the needs of the plant. However, recruiting sufficient members to supply the plant on a daily basis will be difficult. The Northern Plains Premium Beef effort to recruit members is an example of the difficulty a new livestock cooperative may experience. On the other hand, the North American Bison Cooperative is an example of a successful effort.

VIABILITY OF THE NICHE MARKET

The national market for carcass lamb has averaged less than $2 per pound. In the 1990s, the price ranged on an annual basis from $1.17 to $1.77 a pound (see Table 1). 1997 year-to-date prices have averaged $1.83 a pound. This study used a projected price of $2 per carcass pound, a premium of near 9 percent over 1997 prices and near 23 percent over the average price during the 1994 to 1996 period.

The premium price was chosen because the cooperative plans to market specialty wholesale cuts that meet the unique specifications of quality conscious buyers. High value markets for lamb products exist in affluent geographic areas influenced by ethnic and religious demand. These consumers typically demand specialty products and services not provided by major packers, and are willing to pay premium prices.

Certified Fresh American Lamb, a brand name developed by the Sheep Industry Development Council, meets high quality specifications and typically sells for a premium over non-branded lamb. For example, the USDA carcass lamb report dated February 14, 1997, quoted Choice and Prime, Yield Grade 1-4, 55-65 lb., less than carlot (LCL) volume, CAF East Coast, lamb carcasses at $188.50 to $191.50 per hundredweight (cwt.). The same specifications of Certified Fresh American Lamb were quoted at $214/cwt.

Table 1. Lamb Carcass Price History, Choice-Prime, East Coast, 55-65 lb, 1990-1997.

	Time Period				
Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual
	----------$/cwt.----------				
1990	125.10	122.96	121.71	116.12	121.47
1991	111.51	123.83	121.65	117.33	117.33
1992	124.99	142.28	129.32	130.05	131.66
1993	157.24	143.25	133.59	141.78	143.97
1994	134.08	135.90	167.45	153.05	147.62
1995	148.00	167.21	177.75	160.92	163.47
1996	168.25	187.81	186.33	168.02	177.56
1997	186.87	186.90	175.35	NA	183.04 YTD

Source: USDA, Agricultural Marketing Service.

Marketers are selling lamb to consumers at premium prices. Many of these sellers are direct marketing. They are also operating at a level below 400 per week and are located in major urban areas where the potential customer base is larger than North Dakota's.

Producers of the cooperative have identified several confidential niche markets for high quality North Dakota produced lambs. Some examples include marketing to ethnic and religious groups in more urban markets and production of hothouse lambs[2] for that market.

SUMMARY

There is a niche market for the high quality, specialty product this plant would produce. In addition, a premium price for the product can be expected because it meets the specifications of unique consumer groups.

PROPOSED PLANT LOCATION

Hope, North Dakota, is located in southern Steele County in eastern North Dakota. The city is located approximately 35 miles northeast of Valley City, North Dakota. Hope has access to the federal interstate highway system via state highway 32 or 38. The city had a 1990 census population of 281 people. A municipal electric system and a sewer and lagoon system are in place and have the capacity to handle effluent from the proposed plant. Propane and fuel oil are available, but there is not a natural gas supplier.

Hope is the center of 9 percent of the N.D. lamb industry with approximately 8000 lambs available within the east central region. Five livestock auction markets are within 100 miles of Hope.

The Hope city government favors the proposed project and has agreed to award incentives to encourage reopening the plant. The city has guaranteed electrical and water rates for five years with no increase. In addition, they are offering a five-year property tax abatement, pending county approval.

There are several concerns to the proposed location in Hope. Its location away from an interstate highway may add some transportation difficulties. In addition, it may not be as easy to access air transportation, overnight parcel delivery and other transportation options as in a more urban setting.

The plant in Hope is located on the main street of this small community abutting a grocery store on one side and a single family home on the other. There is little room for expansion and only limited room for holding pens, semi-trailer parking and loading/unloading facilities. The building's close proximity to residential areas could be a potential problem for neighborhood complaints about noise, odors, and pests. The highly visible location makes the plant an easy target for complaints.

The existing structure is available for a reasonable price. However, the building and equipment

[2]A lamb born and raised out of the normal season and marketed at six to ten weeks of age.

need extensive renovation to meet federal meat inspection standards.

The city of Hope has offered several inducements to establish the plant in Hope. The community supports the venture and would receive a positive economic impact if the plant were reopened. Balancing this support is the small size of the town. There is a small labor pool to draw from and only limited amenities in Hope to attract new workers to the plant.

SUMMARY

While the proposed location is not ideal, it does meet the minimum requirements of the project and has strong local support.

PLANT INVESTMENT

The estimated purchase price for the existing building and equipment was $22,000 (Erickson). The cost of renovating and adding on to the building to meet the standards needed to obtain federal inspection was estimated at $246,000 (Triple E Construction). Renovations would include a new roof; adding additional floor space; resurfacing existing floor space; changing the layout of the existing plant; and completely refurbishing all walls, electrical fixtures and plumbing. The purchase price and renovation would cost $268,000.

Some equipment was included in the purchase price of the original building; however, the study budgeted for new equipment at $1,200,000 (Koch Supply). Included was new refrigeration equipment, an entirely new set of killing and processing equipment, sausage-making equipment and a smokehouse. Trade sources contacted recommended complete replacement of the equipment presently in place in the existing structure.

Total building and equipment investment was estimated at $1,468,000, but does not include any charges for infrastructure changes, such as road work or water and sewer line upgrades. These costs, if any, were projected to be paid with a grant from the regional development council (Lake Agassiz Regional Council). Projected costs for offal disposal facilities were estimated at $10,000 for 10 acres of land, $20,000 for a front-end loader and $2000 for fencing and access.

The cost of constructing a new structure was also investigated. Construction costs for a new building were estimated at $250,000 plus additional expense for land acquisition. The cost of renovating the existing plant or constructing a new facility were nearly equal and were treated the same in the rest of the analysis.

Total investment in fixed costs was estimated at $1,500,000 plus up to $100,000 in infrastructure improvements. In addition, nearly $500,000 in operating capital would be needed for the project. This project would require $2,000,000 in funds to begin operation.

SUMMARY

Investment costs were higher than originally expected due to the extensive refurbishing necessary to meet federal inspection and increased capacity requirements. While this raises concerns about the ability of the proposed cooperative to raise necessary investment capital, the total investment does not determine success or failure of the project.

ESTIMATED LAMB SLAUGHTER PLANT BUDGET

The largest single variable operating cost category estimated for the proposed plant was the cost of purchasing lambs to slaughter. Lamb purchase expenses from members were estimated, using 130 pounds live weight and a live price of 90 cents per pound for animals delivered to the plant. At full capacity the lamb purchase costs were estimated at $2,340,000 per year. This figure could vary widely if lambs were purchased on the open market. Live lamb prices can be volatile and follow seasonal price patterns.

The second largest expense category is salary and wage requirements. Five employment categories needed for the plant are management, office staff, maintenance, production and food safety. Table 2 provides a breakdown of salary expenses at three levels of plant operation.

The plant was budgeted for one management position. This person would be expected to monitor performance, judge quality and buy lambs; supervise the production facility; oversee the sales and accounting office functions; supervise the maintenance of the plant and its equipment; oversee the operation of the offal disposal operation and be the only salesman for the lamb meat and by-products produced. The manager's job was budgeted at $40,000 per year with a 25 percent allowance for fringe benefits. Salary and fringe benefits at $50,000 per year may be unrealistically low. The 1997 survey of wages in the meat processing industry (Nunes, 1997) shows a median base salary of $75,000 for plant managers/general managers. While this survey was for larger plants than the proposed plant in Hope it is reflective of the competition for the quality of manager needed to handle the diverse needs of this plant.

Table 2. Proposed Slaughter Plant Salaries and Fringe Benefits, ND, 1997.

		Plant Capacity		
		100%	75%	50%
Position	Salary[1]	Salary & Fringe	Salary & Fringe	Salary & Fringe
	----------$----------			
Manager	1 @ 40,000	50,000	50,000	50,000
Office	1 @ 10,000	12,500	9,375	6,250
Maintenance	1 @ 15,000	18,750	14,063	9,375
Production	5 @ 20,000	125,000	93,750	62,500
HACCP	1 @ 22,000	27,500	27,500	27,500

[1]Salary is cash only; final cost includes fringe benefits at 25% of base wage for all workers.

The proposed budget allowed $10,000 for a part-time office worker. At the same level of benefits this was an annual expense of $12,500 for office labor. The office worker would function as the receptionist and bookkeeper, process payroll, generate the billings and answer the phone.

One full-time maintenance person was budgeted at a slightly higher rate than the office person. This employee would be responsible for maintenance of the buildings, grounds, and equipment; and would have responsibility for offal disposal and maintenance of the offal disposal site. Most importantly, this person would be responsible for plant cleaning on a daily basis.

Five production workers were assumed to be required, based on the 1976 survey of slaughter plants in North Dakota. The average output per worker in that survey was used to determine the amount of production labor needed for a plant of this size. Assuming 80 lambs per day each worker would need to completely process 2 head per hour to meet production goals. The average wage for butchers in North Dakota in 1996 was $19,900 per year(N.D. Labor Dept). An estimated $20,000 per year with the same level of benefits as all other employees was budgeted. Production employees accounted for $125,000 in annual payroll.

The federal veterinarian estimated that the additional payroll needs to meet the requirements of HACCP could add up to two additional full-time employees. One person dedicated to HACCP compliance was budgeted. The manager, maintenance person and office staff would perform also some of the tasks. The HACCP person was budgeted at $22,000 plus benefits, due to the semi-supervisory role in insuring compliance with the requirements of the HACCP program.

Investment capital was budgeted to come from three sources including a low interest loan from the regional development council, a loan from commercial sources and members' equity. Public infrastructure investment was projected to come from grant sources. Investment sources and

annual payment schedule at various use levels are shown in Table 3.

Table 3. Proposed Slaughter Plant Investment Sources and Repayment Schedule, ND, 1997.

Source	Plant Capacity and Annual Scheduled Repayment		
	100%	75%	50%
	----------$----------		
$100,000 Loan	6,721	6,721	6,721
$800,000 Loan	93,963	93,963	93,963
$600,000 Member Equity	0	0	0
$1,500,00 Total	100,684	100,684	100,684

Total capital investment requirement was estimated to be $1,500,000. A 40 percent equity position is a common requirement, so up to $900,000 could be borrowed capital. Sources of borrowed capital would include $100,000 from the regional development council at 3 percent interest with a $6721 annual payment for 20 years and $800,000 from commercial sources at 10 percent interest for 20 years. The budgeted annual payment was $93,962.89. Mortgage loans are fixed costs with constant annual payments at all levels of plant operation.

The final source of funds for investment was member equity capital budgeted at $600,000. No repayment was assumed, but a return on investment will be computed. Profits will either be distributed to the investors as dividends or retained by the cooperative and called retained earnings for capital expenditures. Bylaws adopted by the cooperative will designate methods for dividend disbursement and uses for retained earnings.

Depreciation is a major expense category for the plant. The building, valued at $268,000, was depreciated over 20 years using the straight line method. Building depreciation was budgeted at $13,400 per year for the life of the plant. (Table 4)

Equipment, including all new refrigeration, a smokehouse, and new slaughtering and processing equipment, was valued at $1,200,000 and was depreciated over ten years using the straight line method. Budgeted expense for equipment depreciation was $120,000 per year. Both building and equipment depreciation is constant regardless of the percent of plant capacity used. Depreciation expense is documented in Table 4.

In addition to physical plant investment, the plant would require operating capital estimated at $468,400. The major draws on operating capital are live animal purchases and payroll obligations. The operating budget for the plant assumes that the turnaround time on product, i.e. the time between when the expense is incurred and when the payment is received for product, is 60 days. Other studies have used 30 or 45 days for an operating budget. Industry sources indicate that funds for less than 60 days may be insufficient capital for the successful operation of the plant.

The operating budget was derived by dividing total expenses for the year by 12 to determine a monthly expense. Monthly expenses were doubled to compute 60 days of operating capital.

The two most significant variable cost items were lamb purchase and labor costs. At projected full capacity, the plant would purchase 1667 lambs a month. The 60-day lamb purchase expense was just under $390,000[3]. Monthly salary needs were near $19,000. Operating capital needs for salaries would be nearly $38,000. These two expense items alone required working capital of $428,000 to operate 60 days. Together with the other variable expenses, the working capital needs of the plant were estimated at $486,400. The cost of maintaining this pool of capital was estimated at $48,640 per year.

Insurance for property, liability, directors, and workers compensation was budgeted at $33,803 per year. Insurance premiums are constant at all capacity levels and were obtained from a major insurer of commercial property in North Dakota. A breakdown of the insurance expense categories is provided in Table 4. Workers compensation insurance rates for production workers at near $16 dollars per $100 of wages resulted in the total annual bill for workers compensation at over $18,000.

Repairs and maintenance were budgeted at 1 percent of value for the building and 2 percent of value for the equipment. The building repairs are assumed to remain constant at all levels of use. Table 4 records repairs and maintenance costs at various levels of use. Equipment repairs and maintenance were prorated with level of capacity usage in the plant. Equipment repairs were budgeted at $24,000 per annum at full capacity dropping to $18,000 at 50 percent capacity. The rate for reduced capacity use repairs was 1.75 percent of value at 75 percent capacity and 1.5 percent of value at 50 percent capacity. The assumption was that reduced capacity will reduce the amount of wear and tear on machinery and equipment. The reduction in wear and tear was not proportional to the reduction in plant use since some equipment, such as refrigeration, would operate at nearly the same levels regardless of the plant's usage.

[3]Assuming 130-pound lambs at $0.90 per pound.

Table 4. Proposed Slaughter Plant, Depreciation, Repairs and Insurance Expenses, ND, 1997.

		Plant Capacity		
		100%	75%	50%
Depreciation		----------$----------		
	Building	13,400	13,400	13,400
	Equipment	120,000	120,000	120,000
Insurance				
	Property[1]	6,300	6,300	6,300
	Liability [2]	5,120	5,120	5,120
	Directors	4,250	4,250	4,250
	Workers Comp	18,133	18,133	18,133
Repairs				
	Building	2,680	2,680	2,680
	Equipment	24,000	21,000	18,000

[1]Includes building, equipment, and $300,000 of inventory.

[2]Liability insurance estimate also includes employee theft coverage. Coverage is for $5 million liability and $100,000 employee theft.

[3]Coverage is $1 million.

The budget for general travel, dues, and conventions was estimated from a survey of slaughter plants in North Dakota where travel and associated costs ranged from $0.00019 to $0.00025 per pound of live animal sold. Travel and dues for the proposed plant were estimated at $0.00046 per pound. While budgeted at nearly twice the rate of the survey, the total amount was only sufficient to allow travel to one national sales meeting per year.

General office expense was budgeted at $750 per month. While at first glance this may appear excessive, the cost of photocopiers, fax machines, computers, and the service contracts and supplies needed to maintain them have risen dramatically. For example, the service contract at the Hettinger Research and Extension Center for the copy machine alone was $1300 in 1996.

Advertising was budgeted at $1200 per year. This is higher than figures in the survey of slaughter plants, but this survey included many plants whose market was local and whose advertising needs were small. Twelve hundred dollars may be a conservative estimate of the advertising needs of this plant.

No property tax was budgeted for the first five years, because the city offered a property tax exemption for that period. After five years this would need to be added to the budget. The amount of tax obligation at the end of the exemption period was difficult to estimate.

Water use in the plant was estimated from Utility Usage in Small Slaughter Plants (Brasington, 1978). Plant water use was estimated at .36 gal per pound of live weight for processing and 1.36 gal per square foot of building per day for cleanup. The plant expects to process 2,600,000 pounds of live animal causing an annual water use need of 936,000 gallons. The building is approximately 3800 square feet in size. Projecting cleaning for 250 days per year in that size building gives a water use of 1,301,520 gallons. Total water needs were slightly greater than 2.2 million gallons per year. Based on water rates at Hope, the annual water charge was $4620 when operating at full capacity. Water usage would be slightly reduced at lower operating capacity; however, the budget held the charge steady at all use levels since estimating the reduction in use would be difficult.

Utility usage was also estimated from the same study as water usage. Energy use was estimated at 965,000 BTU per 1000 pounds of live weight slaughtered per year. The plant expects to slaughter 2,600,000 pounds at full capacity. An annual use of near 2,500,000,000 BTU would be electricity combined with propane, natural gas or fuel oil. Twenty-five percent electricity and 75 percent propane levels were selected. The plant would need just over 700,000 kwh of electricity and slightly more than 26,000 gallons of propane annually. Municipal electric rates for Hope of $0.037 kwh and the summer fill price of $0.60 per gallon for propane were used to estimate $6500 annually for electricity and $11,700 for propane. These amounts may be reduced at lower capacity uses; however, it is difficult to estimate the energy reduction at lower slaughter rates.

Laundry is a necessary expense in a slaughter plant. Plant workers need large volumes of clean smocks, aprons, hats and other protective clothing. Laundry expenses were estimated to be $1600 based on a survey of small meat processing plants. At reduced slaughter rates, laundry is reduced proportionately. The demands of HACCP may make this expense item even higher.

Slaughter and processing supplies are a surprisingly large expense. Based on the survey a plant this size would need slightly over $9500 in supplies. HACCP will also increase supply costs by an estimated $4,500. Also, HACCP required laboratory analysis will add costs, estimated at near $12,000 per year (Meat and Poultry, May 1997). This brings the total annual supply cost to $26,000. These costs were reduced proportionately in the budgets for reduced slaughter rates.

Miscellaneous charges were based on the survey and estimated at $1600 per year. They were reduced proportionately in the reduced slaughter rate budgets. Delivery charges were not included in the budgets for the proposed plant. All sales were assumed FOB Hope. This may be an optimistic assumption especially, for by-product sales.

Offal disposal was assumed to be by composting. The investment needed to set up a site and purchase equipment was included in investment costs. The maintenance employee was expected to provide the labor. Variable expense for offal disposal was expected to be for the purchase of straw for bulking and fuel for the equipment. Total disposal of offal was calculated at 650 tons per year. Assuming straw is added at 2 times the rate of offal and can be purchased delivered for $25 a ton, the straw bill was estimated at $32,500. Fuel for unloading, delivery and stacking was

estimated to be 1000 gallons per year. Variable costs for offal disposal totaled $33,500 per year and were adjusted proportionately as slaughter rates are reduced.

SUMMARY

Before lamb purchase variable costs were estimated at slightly over $650,000 per year, and at full capacity the lamb purchase costs were $2,340,000 per year. Total annual plant operating costs were near $3 million. At reduced slaughter rates, the lamb purchase expense dropped; however, many of the other costs did not decline.

INCOME

Income was estimated at $2.8 million per year. This included $2.6 million of meat sales and $200,000 from pelt sales. Meat was projected to be sold at $2 a carcass pound, which was a premium over 1997 lamb market carcass prices. Pelts were projected to sell at $10 each. This was under the 1997 market price but is probably reflective of the distribution in quality of pelts that can be expected at the plant, as well as the low volume being offered for sale.

There was no allowance for other by-product sales or sales of compost, which may be a potential income source. The low volume available makes predicting the potential return difficult. Sales from this category should be considered a bonus to this plant. A summary of all expense and income items are detailed in Table 5. A five-year projected cash flow was generated in Table 6. The analysis assumes that the plant operates at 75 percent capacity the first year of operation and then attains 100 percent capacity in year two and on. Profit or loss from the previous year is carried into the next year in this table.

SUMMARY

Estimated operating expenses for the plant exceeded projected income by more than $200,000. Initial estimates of expenses were deliberately made at minimal values to determine if the plant had a chance to operate profitably. Several categories of expenses could realistically exceed initial estimates. However, since initial expenses already exceeded expected income, further refinement and documentation of expenses was not necessary.

Table 5. Proposed Slaughter Plant Expenses, Revenue and Profit, ND, 1997.

	Plant Capacity		
	100%	75%	50%
	----------$----------		
Depreciation	133,400	133,400	133,400
Insurance	33,803	33,803	33,803
Repairs	26,680	23,680	20,680
P and I	100,684	100,684	100,684
Operating	48,640	48,640	48,640
Salaries	233,750	194,688	155,625
Travel, Dues, Etc	1,200	1,200	1,200
Office	9,000	9,000	9,000
Advertising	1,200	1,200	1,200
Property Tax	0	0	0
Water	4,620	4,620	4,620
Electricity	6,500	6,500	6,500
Fuel	11,700	11,700	11,700
Laundry	1,600	1,200	800
Slaughter Supp	26,000	19,500	13,000
Misc.	1,600	1,200	800
Delivery	0	0	0
Offal	33,500	25,125	16,750
Subtotal	673,877	616,140	558,402
Lamb Purchase	2,340,000	1,755,000	1,170,000
TOTAL	3,013,877	2,371,140	1,728,402
Lamb Sales	2,600,000	1,950,000	1,300,000
Pelt sales	200,000	150,000	100,000
By-Product Sal	0	0	0
Subtotal	2,800,000	2,100,000	1,400,000
Profit	-213,877	-271,140	-328,402

A five year cash flow projection is presented in Table 6. Projections assume that the plant operates at 75 percent of maximum capacity in the first year of operation and then achieves 100 percent capacity in the following four years.

Table 6. Projected Slaughter Plant five Year Cash Flow Projection, ND, 1998-2002.

	Year 1 @75%	Year 2 @ 100%	Year 3 @ 100%	Year 4 @ 100%	Year 5 @ 100%
	----------$----------				
Depreciation[1]	133,400	133,400	133,400	133,400	133,400
Insurance[2]	33,803	33,803	33,803	33,803	33,803
Repairs[3]	23,680	26,680	26,680	26,680	26,680
P & I Payments[4]	100,684	100,684	100,684	100,684	100,684
Operating	48,640	48,640	48,640	48,640	48,640
Salaries	194,688	233,750	233,750	233,750	233,750
General[5]	11,400	11,400	11,400	11,400	11,400
Utilities[6]	22,820	22,820	22,820	22,820	22,820
Laundry	1,200	1,600	1,600	1,600	1,600
Supplies	19,500	26,000	26,000	26,000	26,000
Misc	1,200	1,600	1,600	1,600	1,600
Offal	25,125	33,500	33,500	33,500	33,500
Subtotal[7]	616,140	673,877	673,877	673,877	673,877
Carry Over[8]		-271,140	-485,017	-698,894	-912,771
Lamb Purchase	1,755,000	2,340,000	2,340,000	2,340,000	2,340,000
Total Exp.[9]	2,371,140	3,285,017	3,498,894	3,712,771	3,926,648
Lamb Sales	1,950,000	2,600,000	2,600,000	2,600,000	2,600,000
Pelt Sales	150,000	200,000	200,000	200,000	200,000
Total Sales	2,100,000	2,800,000	2,800,000	2,800,000	2,800,000
Profit/Loss	-$271,140	-$485,017	-$698,894	-$912,771	-$1,126,648

[1]Includes building and equipment.

[2]Property, liability, theft and workers comp.

[3]Building and equipment.

[4]Includes all loans, but no provision for member equity repayment.

[5]Includes general travel, dues, convention expense, general office expense and advertising.

[6]Includes water, electricity and fuel.

[7]All variable expenses except lamb purchase.

[8]Previous operating years profit or loss carried into current year.

[9]All expenses including lamb purchase.

ECONOMIC PROFITABILITY

An economic profitability analysis to determine an internal rate of return for the proposed plant and a potential return to member equity was not computed because initial cost and return assumptions resulted in a net loss. However an opportunity cost of equity capital was computed to use in subsequent analyses to identify alternatives which may allow the plant to be feasible.

The original assumption was that the investors in the proposed cooperative would provide $600,000 in equity capital. The opportunity cost of that capital to the investors is equal to the return the members could receive from an alternative investment with similar risk. One argument may be that lamb producer investors may be willing to accept a lower return from their investment in the proposed plant because they would be guaranteed a local market for lambs at a pre-determined price. An alternative argument is that producers would need a higher return on investment because the proposed plant may be riskier that alternative investment opportunities.

A wide variety of investment alternatives can be used for comparison including stocks, bonds, certificates of deposit, mutual funds, and farmland; as well as a number of existing and potential producer-owned cooperatives that require an investment in equity capital. Twenty-year U.S. Treasury Bonds, which may be considered a relatively safe investment, are yielding about 7 percent interest. Shorter term certificates of deposit are yielding about 5 percent , while some stocks and mutual funds are generating close to a 10 percent return. Producer investors may expect a return of from 5 to 10 percent on equity, which means the project would need to generate an additional $30,000 to $60,000 per year to entice producers to invest.

Each individual investor would have a different minimum rate of return that would be acceptable. An average of 7.5 percent or $45,000 was chosen as an example of an opportunity cost of equity capital for use in subsequent analyses.

MAXIMUM BREAK-EVEN INVESTMENT

Previous projections indicated that the total fixed and variable costs would exceed total revenue. Consequently, it was decided to determine what level of costs would allow the proposed plant to break-even. Variable costs vary directly with production and may have been underestimated in some cases. Therefore, it would be difficult to reduce the variable cost category.

Fixed costs are "sunk" costs that include investment in plant and equipment, insurance, etc. These costs do not vary with production, but do affect profitability because of their magnitude.

Two possible solutions for fixed costs that are too high are to either 1) increase volume to lower the per unit fixed costs or 2) reduce the fixed cost expenditure. Since increased volume is probably not a viable option for the proposed plant, the potential for reducing fixed investment was examined. The question is what can be paid for the plant and equipment to break-even.

A budget for operating a slaughter plant at 20,000 lambs a year in North Dakota is shown in Table 7. The analysis works backwards from the previously developed budgets. Starting with the total expected income of $2,800,000 at a production level of 20,000 lambs, the lamb purchase expense of $2,340,000 was subtracted. This provides the gross margin of $460,000 available to pay all other costs. From this gross margin, all other variable costs amounting to $406,813 were subtracted. The balance of $53,187 was the amount that is available to pay for fixed expenses and return on investment, assuming that all other expense items do not change in a plant with less investment.

Table 7. Proposed Plant Maximum Investment to Break-Even, ND, 1997.

	----------$----------	
Total Sales		2,800,000
Lamb Purchase	2,340,000	
Gross Margin		460,000
Workers Comp.	18,133	
Insurance[1]	9,370	
Operating Interest	48,640	
Salaries	233,750	
Travel, Dues, Etc	1,200	
Office	9,000	
Advertising	1,200	
Water	4,620	
Electricity	6,500	
Propane	11,700	
Laundry	1,600	
Supplies	26,000	
Misc.	1,600	
Offal Disposal	33,500	
Total Other Variable	406,813	
Margin After Variable Exp.[2]		53,187
$100,000 Loan[3]	6,721	
$122,000 Loan[4]	14,329	
40% Member Equity[5]	0	
Insurance[6]	1,575	
Repairs and Maintainance	5,550	
Facility Depreciation	12,500	
Equipment Depreciation	12,000	
Profit/Loss.		512

[1]Liability and Directors Insurance.

[2]This is the amount available to pay for facilities, provide a return for investors and return a profit to the plant.

[3]This assumes the first source of borrowed funds would be the same low interest loan from the regional development council that was used in the original projection.

[4]This assumes the second source of borrowed funds is a commercial loan at 10% for 20 years.

[5]No provision is made for return to members equity in this analysis.

[6]Property insurance.

Using the same assumptions as the original budget in Table 3, an investment was calculated that would be near break-even returns. The assumptions were 1) that the first source of funding would be a $100,000 loan at 3 percent interest for 20 years from the regional council, 2) that members would provide 40 percent equity, and 3) that the balance of the 60 percent that is borrowed would be a 20-year loan at 10 percent interest. Since either a renovated or new building would cost about $250,000 after renovation, that figure was used for facility cost. Repairs and maintenance were calculated at 1.5 percent of the entire investment. Depreciation was figured as straight-line for 20 years on the building and 10 years on the equipment.

Calculation of an equipment purchase price that would allow the plant to break-even was made. Results indicated that an equipment purchase price of $120,000 would allow the plant to achieve near break even results. To break-even and to pay a return to member equity, the plant would need to purchase equipment for less than the $120,000 calculated here.

However, a word of caution is necessary. The projection was for break-even results, which allow no room for error. Slight variations in costs or returns put the plant in a negative cash flow with little chance for recovery. A slowdown in sales, a price drop in the lamb meat market, a small increase in one of the variable costs, or even a short closing due to bad weather or equipment failure could change the profit potential from break-even to a loss.

In addition, the break-even equipment purchase price of $120,000 did not provide for a return on member equity. When a return on member's equity is calculated, the break-even equipment purchase price would be further reduced. Furthermore, lenders are likely to be reluctant to finance a project that is projected to at best break even.

Used equipment purchased at a small percentage of new price may turn out to be like the purchase of the building; renovation costs necessary to meet inspection standards may be equal to the purchase price for new equipment. There may be sources of used equipment, because used equipment has been used successfully in other plants. However, the cost of finding equipment and refurbishing it so that it meets the necessary standards may be high.

The assumption that all other costs will stay the same with used equipment is open to debate. If used equipment is purchased, it is fair to assume that downtime will increase due to a heavier equipment failure rate, and equipment costs would increase. It is also fair to assume that equipment meeting the exact specifications may not be available, which may lead to a less efficient plant and higher labor costs.

Finding an existing, but relatively new, plant with equipment that can be purchased within the break-even budget may be a possible solution to making this project happen. The dilemma is finding one with the necessary equipment in this geographic region.

SUMMARY

A reduced investment cost may make the proposed plant feasible. However, finding good used equipment or an alternative site with appropriate building and equipment may be difficult.

PROFIT SENSITIVITY TO CHANGE IN INPUT COSTS

There are many sales and expense categories for a slaughter plant manager to monitor. It is useful to know which categories have the greatest potential to change the profit potential as they change. This allows the manager of an operating plant to focus attention on the most critical factors for success. Knowing these factors also allows potential investors in a proposed plant to assess the potential impact of a change in the estimated operating or investment budget on the projected profit potential. Sensitivities to change in the individual income and expense categories were calculated for the proposed plant and are presented in Table 8.

Table 8. Profit Sensitivity in Proposed Slaughter Plant to Changes in Income or Expenses, ND, 1997.

	Percent Change in Net Profit Caused by 1% Change in Category
	----------%----------
Sales	12.07
Lamb Purchase	-10.08
Salaries	-1.01
Depreciation	-0.57
Investment Payment	-0.43
Operating Interest	-0.21
Insurance	-0.15
Offal Disposal	-0.14
Repairs and Maintenance	-0.12
Slaughter Supplies	-0.11
Fuel	-0.05
Office	-0.03
Electricity	-0.02
Water	-0.02

Table 8 illustrates the substantial effect on profits that changes in sales revenue or lamb purchase price have on the plant's projected profit. Other categories have far less potential to change profit. Thus management should allocate more effort in cost control of live animal purchases and efforts in revenue enhancement than in control of other cost categories.

For example, if the sales revenue is increased by 1 percent, the plant's projected profit is expected to rise by near 12 percent. Since a relatively optimistic price of $2 per carcass pound was assumed for the lamb meat, it may be unrealistic to assume that category could be increased appreciably. Therefore, an analysis of alternative lamb purchase prices which would enable the proposed plant to break-even was made.

The first computation, based on the original assumptions in Table 5, was to determine what price the plant could pay for lambs to break-even. The $213,877 projected loss at 100 percent capacity was deducted from the $2,340,000 total lamb purchase cost. Results indicated that about an eight cents per pound reduction in the lamb purchase price to $0.8177 would allow the plant to break-even. The $0.8177 price does not include a return to member's equity. Including an additional $45,000 in the budget to provide a return to the equity capital invested in the plant reduces the break-even price of lamb purchases to $0.8004. The impact of changing lamb purchase prices is shown in Table 9.

Table 9. Proposed Slaughter Plant Projected Profitability at Various Lamb Purchase Prices, ND, 1997.

	Lamb Purchase Prices ($/lb.)			
	0.9000	0.8177	0.8004	0.7358
	----------$----------			
Total Revenue	2,800,000	2,800,000	2,800,000	2,800,000
Total Costs	3,013,877	2,800,000	2,755,000	2,582,207
Cash Return	-213,877	0	45,000	217,793
Equity Cost	45,000	45,000	45,000	45,000
Economic Profit	-258,877	-45,000	0	168,000
Economic Profit With 25% Cost Increase[1]	-426,877	-213,000	-168,000	0

[1]This would raise plant operating costs by approximately $168,000.

Table 9 also demonstrates the effect of increasing costs on the plant's ability to pay for lamb purchases. In the original estimated budget, several categories have potential to increase the plant's cost of operation. For example, no allocation was made for property taxes or delivery in the original budget. Furthermore, the estimate for offal disposal was made using the assumption that composting would be a feasible solution. The potential exists for costs to exceed the original estimates. Thus, Table 9 shows the effect of a 25 percent increase in plant operating costs on lamb purchase price. A lamb purchase price of $0.7358 per pound would cover a 25 percent increase in costs and a return on member equity.

The proposed plant's profits are sensitive to the market price for lamb carcasses, the primary product produced. Projections were made using $2 per carcass pound for lamb, which is a premium over the wholesale trade price for lamb. If the plant was unable to achieve this price for carcasses, the price paid for live animals would need to be adjusted. The impact of lower carcass sales prices on the break-even purchase price of lambs is documented in Table 10.

Table 10. Impact of Lower Carcass Prices on Break-Even Lamb Purchase Prices, ND, 1997.

	Carcass selling prices ($/lb.)			
	2.00	1.90	1.80	1.70
	----------$----------			
Total revenue	2,800,000	2,670,000	2,540,000	2,410,000
Operating Costs[1]	673,877	673,877	673,877	673,877
Gross Margin	2,126,123	1,996,123	1,866,123	1,736,123
Equity Costs	45,000	45,000	45,000	45,000
Live Purchase[2]	2,081,123	1,951,123	1,821,123	1,691,123
Break-even Price[3]	0.8004	0.7504	0.7004	0.6504

[1]Costs before lamb purchase expense.

[2]Total amount available for live lamb purchase to break-even.

[3]Live lamb price per pound to break-even at various carcass selling prices.

SUMMARY AND CONCLUSIONS

A group of North Dakota lamb producers who are members of Valley Wool Growers Association identified several niche markets for high-quality North Dakota lambs. The potential availability of a closed, but formerly federally inspected, livestock slaughter and meat processing facility in Steele County heightened their interest in determining the feasibility of a cooperatively owned lamb slaughter and processing facility. The cooperative would be patterned after existing and proposed slaughter cooperatives, whereby cooperative members would own shares to supply lambs to the plant on a year-round basis.

Valley Wool Growers Association applied to the Agricultural Products Utilization Commission in North Dakota for a grant to cover the cost of a feasibility study of the proposed plant in Hope. Funding was granted, and the research was conducted by researchers at the Hettinger Research and Extension Center and the Institute of Natural Resources and Economic Development (INRED) in the Department of Agricultural Economics at North Dakota State University.

The analysis was conducted in several sections corresponding to critical factors which affect feasibility of the plant. The critical factors analyzed included federal inspection requirements, the

potential of an adequate supply of lambs, the potential for a viable niche market, plant investment and operating costs, expected return, alternative lamb purchase prices, alternative lamb carcass sales prices, and several investment and expense scenarios.

The supervising veterinary medical officer for USDA, FSIS toured the existing plant and concluded that the plant should be renovated to a “like new” status before it would be approved for reopening under federal inspection. Since federal inspection is mandated by law, the USDA is obligated to provide inspection to a plant that meets specifications. Therefore, if the plant was renovated to a “like new” status and approved, federal inspection requirements would not prevent the plant from being operational.

Sheep numbers in North Dakota and the region, coupled with new technology in year-round lamb production, indicate that enough lambs could be available to meet the needs of the plant. However, recruiting sufficient members to supply the plant on a daily basis may be difficult. The cooperative would need high quality slaughter lambs with a consistent weight and grade. An educational program would be necessary to inform members of the additional feeding requirements necessary to meet the weight and quality goals of the cooperative.

Producers in the proposed cooperative identified several confidential niche markets for high quality North Dakota produced lambs. Some examples include marketing to ethnic and religious groups in more urban markets and production of hothouse lambs for that market. There is a niche market for the high quality specialty product this plant would produce. In addition, a premium price for the product can be expected because it meets the specifications of unique consumer groups.

The building and equipment investment was projected to be $1,468,000 which was higher than originally expected due to the extensive refurbishing necessary to meet federal inspection and increased capacity requirements. Plant operating expenses at full capacity were projected to be $3,013,877 per year which included $673,877 in operating expenses and $2,340,000 for lamb purchase. Income from lamb meat sales and pelts was estimated at $2,800,000 per year.

The assumptions of purchasing lambs for $0.90 per pound and selling the meat for $2.00 per carcass pound resulted in an annual negative margin of $213,877 at full capacity.

An economic profitability analysis to determine an internal rate of return for the proposed plant and a potential return to member equity was not computed because initial cost and return assumptions resulted in a net loss. However, an opportunity cost of equity capital of $45,000 was computed to use in analysis of alternatives which may allow the plant to operate profitably.

An analysis of equipment investment costs concluded that only $120,000 minus the cost of equity capital could be spent to allow the plant to break-even. Since used equipment may be difficult to obtain, an analysis of alternative lamb purchase prices was conducted. Results indicated that a lamb purchase price of $0.8004 per pound would be necessary to cover all original cost

assumptions and provide a return to member investor equity. A 25 percent increase in non-lamb purchase costs would further reduce the lamb purchase price to $0.7358 per pound.

RECOMMENDATIONS

The original idea for lamb producers to purchase the existing slaughter and processing facility in Hope, North Dakota, expand and remodel it to slaughter and process 20,000 lambs annually, refurbish it to meet federal inspection specifications, pay the producer members $0.90 per pound for lambs, and sell the meat for $2.00 per carcass pound was projected to operate at a loss.

Therefore, other scenarios were investigated which would enable the plant to operate profitably. The maximum price that could be paid for lambs to pay all investment and operating costs, including a 7.5 percent return to member equity, was $0.8004 per pound. A 25 percent increase in projected costs would reduce the purchase price to $0.7358 per pound, or a reduction in the lamb carcass sales price to $1.80 per pound would reduce the lamb purchase price to $0.7004.

The range in probable prices that could be paid for lambs is $0.70 to $0.80 with a likely price of $0.75. The proposers of the cooperative will need to decide if prices in this range would be sufficient to lure enough member investors to provide the 20,000 lambs necessary to operate the plant.

The idea to add value to locally produced lambs and provide product to a niche market is a good one. It should not be lost even if the viable purchase prices are considered too low to generate sufficient interest. Other alternatives could be considered and include the following:

1) A viable niche market for high quality, specialty lamb products does exist; so producers may want to pursue slaughtering lambs on a custom basis in an existing slaughter facility. This would eliminate the initial investment costs in buildings and equipment and enable producers to concentrate on producing and marketing a high quality product. It would allow starting on a smaller scale with fewer lambs per year. The authors highly recommend this alternative.

2) Producers may pursue alternative packing plant sites which may be for sale. However, the likelihood of finding a suitable building with adequate equipment in the immediate geographic area for under $400,000 may be small.

3) Other lamb producer groups in Minnesota, Wyoming and the Dakotas have also expressed an interest in building or purchasing a lamb slaughter facility. Producers may want to coordinate activities with one or all of these groups to see if a larger, regional plant would be feasible. Valley Wool Growers Association may even want to take leadership in attempting to bring all these groups together to discuss alternatives for a regional lamb slaughter, processing, and marketing project. The authors also recommend this alternative.

4) Stringent federal inspection specifications along with the new HACCP requirements cause relatively high per unit costs for small slaughter plants. There are several other livestock producer groups (ratite, elk, deer, goat, specialty beef, etc.) who may like to have access to slaughter and processing facilities. Rural economic development funds may be available to assist producer groups in building a multi-species "incubator" type of slaughter facility in which groups could share in the costs and scheduling of the plant. It could be billed as a demonstration project for possible adoption in other geographic areas if it is viable. Furthermore, small slaughter plant operators may need to seek some sort of regulatory relief, particularly with HACCP, from Congress in order to remain a viable industry.

North Dakota State University looks forward to further assisting lamb producers in whichever alternative they decide to pursue.

NEED FOR FURTHER RESEARCH

The 1979 survey of small slaughter plants information is still the best source of costs and capacities in small slaughter plants. However, this study is dated. A repeat of the survey would provide valuable current information to the many groups looking to expand livestock slaughter in the Northern Plains.

A growing concern for all slaughter plants is the disposal of non-saleable offal products. A research and demonstration project of composting red meat offal products would allow a more accurate picture of the potential of this technology and its costs and returns.

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