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## **ESTABLISHING A BEEF CATTLE FEEDLOT USING BY-PRODUCTS OF ETHANOL PRODUCTION IN NORTH DAKOTA**

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North Dakota exports a large share of the feed grains it produces rather than feeding it to feeder calves which it also exports. Ethanol production in North Dakota produces wet distillers' grains (WDG) and thin stillage as by-products which are dried and exported as dried distillers' grains (DDG). This study estimated the economic feasibility of building and operating a beef feedlot which would use locally raised beef calves, feed grains, and by-products (wet distillers' grains and thin stillage) from an ethanol plant.

Investment and operating costs were determined for a 10,200 head feedlot finishing 22,161 head of cattle annually. The estimated investment for the feedlot was \$2,033,502. The feedlot was assumed to take six months to reach full operating capacity and would require approximately \$6.4 million in operating capital before the first finished cattle are sold (Stearns et al. 1993).

The greatest source of uncertainty for determining the financial feasibility of the feedlot is feed consumed and livestock response to wet distillers' grains and thin stillage. Because of limited information in this area, three feeding programs and associated performance were analyzed.

The first scenario used livestock performance data from a 1993 Carrington feed trial where steers were fed a diet of corn, straw, grass hay, and wet distillers' grains (WDG). This scenario was designed to use WDG, based on performance of steers fed in a WDG and corn feeding trial at Carrington Research Center, winter 1992-93. Second was the conventional ration, representing the profitability of feeding steers and heifers a ration of corn, barley, alfalfa, and straw. Third was performance analysis using the ADM steer feeding trial results where steers were fed alfalfa, corn, barley, wet distillers' grains, thin stillage, and cob meal. The ADM feed trial fed 95 steers from 562 lbs. to 1044 lbs. during the winter of 1991-92 in Walhalla, North Dakota. The number of cattle fed each year differed in each scenario because of varying performance by animals on different rations. The Carrington trial scenario marketed 22,161 head annually, while the conventional and ADM trials marketed 19,759 and 19,101 head, respectively.

For the first analysis, Carrington trial calves were purchased at 507 pounds and finished at 1,015 pounds. In the other scenarios, calves were purchased at 562 pounds and marketed at 1,044 pounds, the average purchase and selling weights in the ADM feeding trial. West

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Fargo prices were used for feeder calves. Sioux City, Iowa, prices were used to estimate selling price of fat steers and heifers (Petry, 1992).

A ten-year planning horizon was used to estimate feasibility of the feedlot. Cattle and feed prices were used from 1980 through 1989. The beginning year was 1980 because of the position of the cattle cycle and its similarity to the current expansion phase (Petry, 1992). Yearly average prices were used in all scenarios. However, using yearly average prices for cattle and feed grains will reduce price variability and possibly increase profitability.

Table 1 summarizes ten-year profitability and cash flow analysis results found in Tables 2 and 3. Cash flow is positive while profitability per head is negative in some cases, because profitability calculations include depreciation charges and interest on investment, while cash flow includes interest and principal repayment on outstanding debt.

**Table 1. Cumulative Cash Flow and Profitability After 10 Years and Average Profitability per Head for the Proposed Ration, Conventional Ration, and ADM Steer Feeding Trial Performance**

Scenario	Cumulative Cash Flow <sup>a</sup>	Cumulative Profitability	Average Profit Per Head		
			Steer	Heifer	Combined
Carrington Trial	\$ 6,091,240	\$ 2,280,367	\$9.88	<sup>a,b</sup>	*
Conventional Ration	144,209	(4,905,950)	(\$33.91)	(\$15.14)	(\$24.83)
ADM-trial	6,571,928	1,726,504	\$9.04	*	*

<sup>a</sup>Cumulative net cash flow does not include the 30 percent down payment on capital investment.

<sup>b</sup>Is not calculated because trial did not include this information.

A monthly cash flow for operating the feedlot in year one is shown in Table 4. Start up assumes that 1,850 head of 507 lb. feeder cattle are purchased monthly. Monthly feed costs, operating expenses, wages, and operating interest were calculated, using total expenses for year one. Finished cattle were sold at 1015 lbs. at the end of the feeding period. The operation will require \$6.4 million in capital and start up investment before the first cattle are marketed in the seventh month of operation. Cattle in the WDG feeding trials were considered finished at 1015 and 1044 pounds. The meat packing industry prefers finished cattle in the 1100-1300 pound range and may discount lighter animals (Reed 1989). The ration was adjusted to finished the cattle at 1190 pounds which improved profitability and net cash flow.

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**Table 2. Profitability Per Head for the Carrington WDG Trial Ration Using Operating Costs/Head - Finishing Steers, 507-1015 lbs., 1993**

Category	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10	Average
Variable expenses Steers											
	dollars										
Feeder purchase	419.50	353.54	336.29	343.02	339.37	334.74	334.15	411.11	470.90	476.50	381.91
Trucking-in 3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66
Trucking-out 17.02	17.02	17.02	17.02	17.02	17.02	17.02	17.02	17.02	17.02	17.02	17.02
Veterinary 11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50	11.50
Feed-lbs.(as fed)											
Grass Hay 323	7.97	9.82	6.95	5.04	5.27	5.88	5.78	4.55	7.56	9.49	6.83
Straw 357	5.56	6.92	4.95	3.85	4.21	4.83	4.61	3.61	6.25	7.83	5.26
Wet Dis.grain 2,973	72.48	79.83	72.24	79.62	76.30	48.15	49.54	58.47	71.31	69.98	68.79
Stillage 168	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Corn 1,592	88.86	70.85	75.97	91.60	78.52	67.16	43.85	59.77	73.69	68.01	71.82
Vit.&min. 158	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90
Total feed	182.66	175.32	168.00	188.00	172.20	133.91	121.68	134.29	166.70	163.20	160.60
Death loss 1.00%	4.19	3.54	3.36	3.43	3.39	3.35	3.34	4.11	4.71	4.77	3.82
Operating interest	28.66	25.34	24.23	25.43	24.55	22.63	22.05	26.10	30.27	30.37	25.96
Fixed expenses- interest charged on overhead, & labor for 6 months											
Labor 8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44
Overhead 6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78	6.78
Depreciation 11.55	11.55	11.55	11.55	11.55	11.55	11.55	11.55	11.55	11.55	11.55	11.55
Fixed interest/year 4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81
Total cost	698.77	621.49	595.64	623.64	603.28	558.38	544.98	639.38	736.34	738.60	636.05
Break even price/cwt	70.24	62.47	59.87	62.68	60.64	56.12	54.78	64.27	74.01	74.24	63.93
Profit/head	(47.35)	23.50	29.66	6.70	10.43	(3.10)	74.24	33.92	(27.29)	2.16	9.88
Cumulative Profitability	(1,049,244)	128,732									
	(528,479)		277,196								
				508,260							
					439,632						
						2,084,739					
							2,231,598				
								2,836,332			
									2,279,418		

**Table 3. Ten-year Cash Flow for the Carrington WDG Trial for Finishing Steers, 1993**

[illegible]



**Table 4. Start Up Cost and Financial Requirements for Year One Operation.**

Month	1	2	3	4	5	6	7	8	9	10	11	12
<b>EXPENSES</b>												
Calf purchase	774,694	774,694	774,694	774,694	774,694	774,694	774,694	774,694	774,694	774,694	774,694	774,694
Feed	56,221	112,443	168,664	224,885	281,107	337,328	337,328	337,328	337,328	337,328	337,328	337,328
Operating-Truck,												
Vet.&Overhead	52,865	52,865	52,865	52,865	52,865	52,865	52,865	52,865	52,865	52,865	52,865	52,865
Wages	15,583	15,583	15,583	15,583	15,583	15,583	15,583	15,583	15,583	15,583	15,583	15,583
Principal Repayment	0	0	0	0	0	0	12,622	12,622	12,622	12,622	12,622	12,622
Interest-fixed	11,566	11,566	11,566	11,566	11,566	11,566	11,566	11,566	11,566	11,566	11,566	11,566
Operating interest	5,115	7,307	15,071	23,292	31,970	41,105	50,696	50,227	49,758	49,289	48,821	48,352
Total cash outflow	916,044	974,458	1,038,444	1,102,886	1,167,785	1,233,141	1,290,705	1,290,236	1,289,767	1,289,299	1,288,830	1,288,361
<b>INCOME</b>												
Gross sales	0	0	0	0	0	0	1,286,146	1,286,146	1,286,146	1,286,146	1,286,146	1,286,146
Net cash flow	(916,044)	(974,458)	(1,038,444)	(1,102,886)	(1,157,785)	(1,233,141)	(4,559)	(4,090)	(3,621)	(3,152)	(2,683)	(2,215)
Cumulative total	(916,044)	(2,928,946)	(5,199,617)	(6,437,316)	(6,437,316)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)
	(1,890,503)	(4,031,832)	(5,199,617)	(6,437,316)	(6,437,316)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)	(6,445,027)
<b>Annual Expenses Used</b>												
Calf purchase		9,296,332					4,047,938					
Operating-Truck,							187,000					
Vet.&Overhead		956,414					2,033,502					
Interest-fixed		9.75%					9.75%					
Oper interest												

The feedlot would provide economic development for a local community. It would employ eight to ten full-time employees and generate between \$10 to \$15 million in gross sales every year. Annual cash operating expenses would range from \$10 to \$15 million. Much of the cash expenses will be paid to local livestock and grain producers. Hay, forage, barley, and corn purchased annually for the feedlot would average about \$3.5 million. Assuming the feedlot is running at capacity, \$187,000 in wages and benefits would be paid annually. Miscellaneous operating expenses, such as veterinary, trucking, fuel, and repairs, would be approximately \$1 million per year. A feedlot financed locally could mean an additional average \$640,000 in operating interest per year and \$138,000 in interest paid on fixed capital investment in the first year.

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