Estimating Profitability of Cow-Calf Operations and Retained Ownership Alternatives in North Dakota

Randall D. Little and **David L. Watt**

The cattle cycle, with its fluctuations in inventory and prices, imposes a unique set of risks on beef production. Cow-calf producers, because of their position in the beef production process, are espcially vulnerable to price extremes that characterize the cattle cycle. Although first in the production process, cow-calf operations are last to feel the effect of price fluctuations. Slaughter plant and feedlot operations are capable, to some extent, of passing some of their losses along in the system. Their decisions to buy and at what price are based on anticipated market conditions at the expected time of sale. For example, if a feedlot operator expects a difficult period in the future, his bid price for feeder cattle will be adjusted accordingly. He also has the option to operate at less than full capacity. The cumulative effect of feedlot managers' decisions heavily influences demand for weaned calves. Cow-calf operators receive a culmination of losses that occur as lower slaughter and feeder cattle prices and feeding losses are passed through the system (Hasbargen et al., 1983).

The objective of this article is to present research results where the profitability of cow-calf operations and several vertical integration alternatives in the form of retained ownership were estimated. Vertical integration is defined as the combination and coordination of successive production and/or marketing stages within one firm (Cramer and Jenson 1979). The options of retained ownership examined in the study included

1. Cow-calf and backgrounding;
2. Cow-calf and wintering;
3. Cow-calf, wintering, and pasturing;
4. Cow-calf and custom backgrounding;
5. Cow-calf and custom feeding a weaned calf;
6. Cow-calf, backgrounding, and custom feeding;
7. Cow-calf, wintering, and custom feeding; and
8. Cow-calf, wintering, pasturing, and custom feeding.

Discussion in this article will be limited to options 1, 3, and 6 because they are the most common and because of space limitations.

Description of the Situation

Beef production is a vital part of the agricultural industry in North Dakota. The sale of cattle and calves is a major source of cash farm receipts, ranking second to wheat in 1983. Receipts for the sale of cattle and calves accounted for 17 percent of total cash receipts for all crop and livestock products and 69 percent of total cash receipts for all livestock products in 1983 (North Dakota Agricultural Statistics, 1985).

According to the Census of Agriculture, the average beef cow herd in North Dakota had 77 cows in 1982. Beef cows constituted almost 91 percent of the cows and heifers that calved in North Dakota as of January 1, 1985 (North Dakota Agricultural Statistics, 1985).

Virtually all calves produced in the state are either sold at weaning, backgrounded and sold in the spring, or wintered, pastured, and sold the next fall. The number of calves sold at weaning or held for further feeding is contingent primarily upon feed availability. A greater proportion of the calf crop is fed beyond weaning in years of ample moisture when feed supplied are adequate. But in years when feed is inadequate, more calves are sold in the fall at weaning. Feeder calves sold in North Dakota are generally shipped out of state for finishing. Very few calves are fed to slaughter weight in North Dakota.

Costs of Production

Budgets reflecting the costs of production of several beef cattle enterprises typical to North Dakota were constructed at 1984 price levels. Budgets reflecting the costs of production of several custom feeding options were also constructed. The budgets included a cow-calf operation; backgrounding, wintering, and pasturing steers and heifers; custom backgrounding steers and heifers; and custom feeding backgrounded, wintered and wintered and pastured steers and heifers.

The approach used to construct these budgets is based on the "opportunity cost" (returns foregone in the best alternative use) of resources employed. When using the opportunity cost method, inputs are valued using current market prices rather than what may have actually been paid for the inputs.

There is much variation in production costs among producers. Differences occur due to production practices, managerial ability, and size and type of machinery

Little is research assistant and Watt assistant professor, Department of Agricultural Economics.

employed. This variability means that the costs individual producers incur (and consequently their profitability) may vary considerately from the estimate of average costs presented. Conclusions reached, therefore, do not apply to producers with costs significantly different from the average.

The Cow-Calf Operation

The cow-calf production costs were based on an average-sized spring calving operation. The operation weaned calves from 90 percent of the cows and heifers assumed bred. It was assumed that cow-calf operators replaced 16 percent of their cows annually. To allow for this they retained 18 percent of their calves, all heifers, from which replacements were chosen. Cull cows and cull replacement heifers weighed 1,000 and 750 lbs., respectively. Weaned steers and heifers weighed 425 and 400 lbs., respectively. There were 45 percent of a steer (half of the 90 percent calf crop) and 27 percent of a heifer (half of the 90 percent calf crop minus 18 percent retention rate) sold per cow each year.

Backgrounding

A high rate of gain that requires feeding a high protein and energy ration is the emphasis in a backgrounding program. Calves enter the backgrounding program after weaning in the fall and are sold or custom fed in the spring. Program length is 150 days. Steers enter the backgrounding program at 425 lbs. and weigh 675 lbs. at the end. Heifers enter the program at 400 lbs. and are marketed at 625 lbs. The average daily gain for steers and heifers are 1.7 and 1.5 lbs., respectively.

Wintering and Pasturing

The wintering feeding program involves low weight gains and an inexpensive, high roughage diet. Compensatory gain is higher for wintered calves than for backgrounded calves so their capacity for growth in a pasturing phase is greater. The wintering phase lasts 150 days, and the pasturing phase lasts 120 days. Steers and heifers enter the program weighing 425 and 400 lbs. Steers weigh 800 lbs. and heifers 740 lbs. at the end of the program. Average daily gains for steers and heifers, respectively, are 1.0 and 0.9 lbs. in the wintering phase and 1.9 and 1.7 lbs. in the pasturing phase.

Custom Feeding

The custom feeding option involves feeding backgrounded calves to slaughter weight. Steers weigh 675 lbs. and heifers 625 lbs. before shipment to a feedlot. A 4 percent transit shrink was assumed for all animals. The animals were sold at the feedlot. Steers weighted 1,100 lbs. and heifers 970 lbs. at the time of sale. Average daily gains for steers and heifers were 3.0 an 2.7 lbs., respectively.

Methodology

Production costs at 1984 levels were adjusted back over time to 1958 using indices of prices paid by farmers for certain goods. Total production costs of the retained ownership options were calculated by adding the cow-calf production costs to 45 percent of the steer feeding production costs in the following year and to 27 percent of the heifer feeding production costs in the following year. These percentages represent the percent of steers and heifers sold per cow. Break-even prices were calculated by dividing the expected production in hundredweights (cwt) of expected output per cow into the estimated production costs.

The break-even price and market price were used to estimate profit per cwt. The adjusted market price was a combination of steer and heifer prices in the proportion of their production. Profit per cwt was multiplied by the cwt of expected output per cow to yield an estimate of the profit per cow.

Results

The cow-calf operation in this study had an average profit of $2.26 per cow per year over the 26-year period (Table 1). The cow-calf and backgrounding operation averaged $21.36 of profit per cow; the cow-calf, wintering, and pasturing operation, $24.04 per cow; and the cow-calf, backgrounding, and custom-feeding operation, $25.57 per cow.

Considerable variation was displayed in each production alternative, especially after 1972 (Figures 1, 2, 3, 4). Variability, as measured by the standard deviation, was quite similar among the alternatives. The coefficient of variation (CV), a measure of variation relative to earnings found by dividing the standard deviation by the mean, indicated that the cow-calf operation has by far the most price risk. This was a result of having narrow profit margings without offsetting reductions in variability. Although retaining ownership reduced the CV drastically, the operations that retained ownership were still exposed to significant price risk. The probability of generating negative profits in any given year is high.

Perhaps the best method of evaluating retained ownership is comparing profitability when calves from a given calf crop were sold. The cow-calf and backgrounding operation improved profitability per cow over the cow-calf operation in 20 of the 26 years studied; the cow-calf, wintering, and pasturing operation in 21 of the years; and the cow-calf, backgrounding, and custom-feeding operation in 20 years. Selling calves at weaning was the most profitable in the remaining years, especially in 1963, 1973, 1979, and 1980.

Summary and Conclusions

The objective of this article was to discuss the potential benefits of retaining ownership in cow-calf operations. Three alternatives of retained ownership were examined, cow-calf and backgrounding; cow-calf, wintering, and pasturing; and cow-calf, backgrounding, and custom

Table 1. Estimated Profitability of Cow-Calf and Retailed Ownership in North Dakota, 1958-1984.

	Cow-Calf	Cow-Calf and Backgrounding	Cow-Calf, Wintering, and Pasturing	Cow-Calf, Backgrounding, and Custom Feeding
			$/cow	
1958	87.18			
1959	13.69	105.29*	108.69*	97.08*
1960	- 8.78	25.88*	21.74*	21.26
1961	19.52	7.93*	13.76*	8.85*
1962	20.48	31.09*	45.87*	64.86*
1963	0.89	18.67	27.55*	18.21
1964	- 27.90	- 10.24	- 9.21	10.27*
1965	6.07	- 22.75*	- 2.08*	8.06*
1966	45.27	27.40*	30.66*	23.95*
1967	10.87	47.30*	54.55*	58.12*
1968	15.73	17.08*	18.93*	34.17*
1969	40.14	36.09*	45.06*	42.61*
1970	28.09	65.60*	55.70*	53.30*
1971	35.44	38.92*	52.56*	61.59*
1972	97.55	57.37*	77.34*	66.76*
1973	132.23	154.72*	179.67*	126.86*
1974	- 132.76	92.55	42.83	72.12
1975	- 114.70	- 141.70	- 112.73*	- 44.33*
1976	- 7.49	- 85.99*	- 107.96*	- 110.90*
1977	- 33.23	- 3.98*	4.84*	10.75*
1978	141.57	23.31*	66.42*	52.00*
1979	109.12	251.96*	226.59*	203.51*
1980	- 37.02	154.02	165.48	164.24
1981	- 116.39	- 67.91	- 81.64	- 84.13
1982	- 108.74	- 113.94*	- 105.12*	- 124.21
1983	- 79.18	- 91.39*	- 134.26	- 116.58
1984	- 72.81	- 61.89*	- 60.27*	- 53.71*
Average	2.26	21.36	24.04	25.57
Maximum	190.12	251.96	226.59	203.51
Minimum	- 132.76	- 141.70	- 134.26	- 124.21
Standard Deviation	78.75	86.18	87.61	78.80
Coefficient of Variation	34.85	4.03	3.64	3.08
Average Profit/cwt	.75	4.52	4.29	3.48
Profit/$ Production Cost	.39	.25	.32	.20

*Denotes when profit per cow increased by retaining ownership of a given calf crop.

feeding. Profitability per cwt produced and per cow and average return on production cost were estimated from 1958 to 1984. The budgets used to estimate costs of production were based on the opportunity cost of the resources used.

Results indicated that beef production and especially the cow-calf operation is exposed to significant price risk. The riskiness reflects the need for informed managerial involvement in production and marketing decisions. As the risks in beef production increase, the level of management should increase as well, especially with respect to financing. Exposure to financial risk should be minimized.

Retained ownership was shown to be a viable production and marketing alternative that can drastically reduce the price risk inherent to the cow-calf operation that markets weaned calves. However, retaining ownership increases the cost of ownership in terms of the additional operating capital required. For example, the total cost of producing weaned calves in 1983 was $255.53. The cost of retaining ownership and backgrounding and custom feeding those calves was $513.38. An operation's cash flow must be carefully analyzed prior to considering retaining ownership due to the increased operating expense burden, especially in the first year. Producers must also consider the additional production risk of custom feeding because the

animals are outside their personal management control. The cow-calf, backgrounding, and custom feeding operation had the least price risk and the highest average profit per cow of the options discussed. There were several years, however, when selling calves at weaning was the best alternative for maximizing profit. Therefore a mixed strategy should be considered. Further details of this study will be presented in a forthcoming Agricultural Economics report that compares the profitability of cattle enterprises in North Dakota.

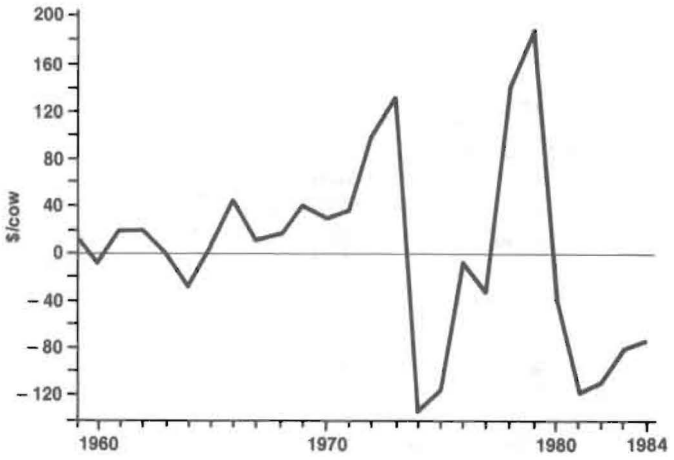

Figure 1. Estimated Profitability Per Cow on an Average North Dakota Cow-Calf Operation (77 cows), 1959-1984.

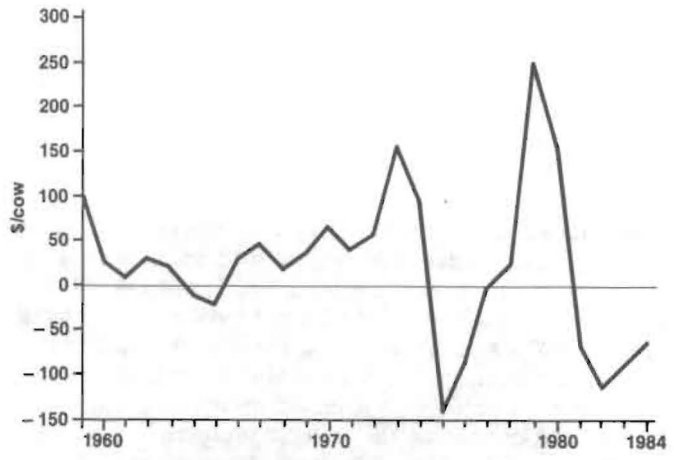

Figure 2. Estimated Profitability Per Cow on a Cow-Calf with Backgrounding Operation, 1959-1984.

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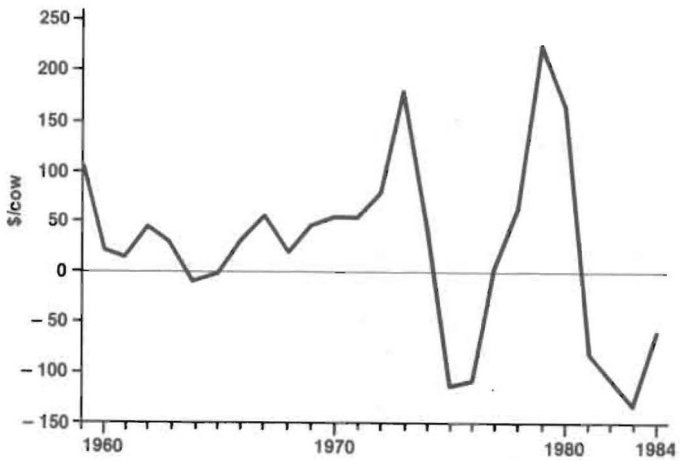

Figure 3. Estimated Profitability Per Cow on a Cow-Calf with Wintering and Pasturing Operation, 1959-1984.

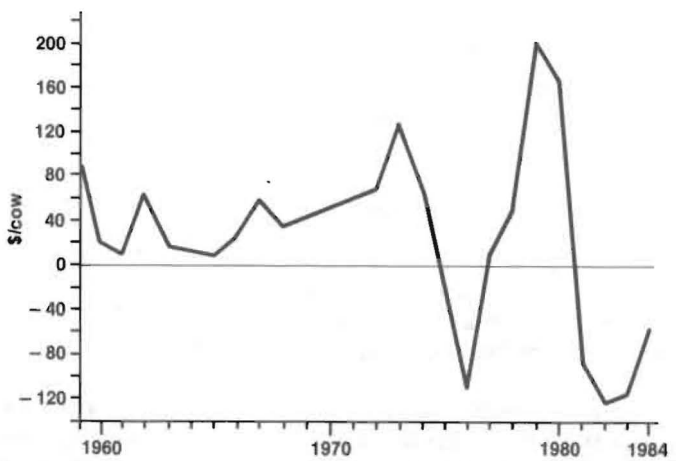

Figure 4. Estimated Profitability Per Cow on a Cow-Calf with Backgrounding and Custom Feeding Operation, 1959-1984.