INTEGRATED REPRODUCTIVE MANAGEMENT

NORTH DAKOTA STATE UNIVERSITY
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PART II. ECONOMICS OF BEEF CATTLE PRODUCTION PRACTICES

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One of the primary criteria used for evaluating management effectiveness of a cow herd is the total pounds of beef produced per cow unit. Effective management can increase the production per cow unit in two ways — through increased calf crop percentages and increased weaning weights.

To illustrate the economic importance of cost analysis on a per cow basis, the following example was prepared using the AGNET (Agricultural Computer Network) program titled COWCOST. The COWCOST program provides a cost and return budget analysis for the cow-calf enterprise.

A second AGNET program called FEEDMIX was used to develop the rations used in the COWCOST analysis. The FEEDMIX program determines a least-cost, nutritionally balanced ration for the type and condition of livestock being fed. For this example, the following feeds and associated prices were used as inputs:

Alfalfa hay@$50/ton
Corn silage@$18/ton
Oat straw@$20/ton
Corn grain@$2.30/bushel

It was assumed that these feeds would be used for the 185-day winter feeding period, with pasture and crop aftermath providing feed during the remainder of the year. The ration fed varied to match nutritional requirements according to the cow's stage of the reproductive cycle.

Table 1 shows the example input data used in the COWCOST analysis. Costs and other input data used in the following analysis are intended for example purposes only and will not be an accurate representation of costs for any individual operator. In any budgeting process, each producer should compute and use his own data.

The resulting costs per cow unit are indicated in Table 2. Variable costs are those associated with the actual production and sale of a commodity, such as feed, labor, marketing and other operating expenses. Fixed costs are those incurred whether or not a commodity is produced, such as land payments, insurance on buildings and real estate taxes.

A distinction between the two types of costs is often useful in planning and decision-making. All costs of production must be considered when making long-run decisions. Short-run decisions, however, are often based on the necessity to cover variable ("out-of-pocket") costs. While interest on breeding stock and bull depreciation would normally be included under the variable cost category, they are considered fixed costs in the COWCOST program under the assumption that a long-run decision to maintain a cow herd has been made.

In this example, total variable costs were $145.58 per cow unit, **after** adjustment for returns from cull cow sales. Returns from cull cows were treated as a reduction in costs because they are, in a sense, a by-product of calf production. Total costs of production, including fixed costs and adjusted for cull-cow value, were $282.06 per cow unit.

A financial summary for the example enterprise is provided in Table 3. With the costs, production per unit and market prices used in this example, the operation falls $70.92 per cow unit **short** of covering all costs of production. With all other factors unchanged, it would require a market price for calves of $90.84 per hundredweight to breakeven on all costs of production. Variable costs, however, could be covered by a calf price of $46.89 per hundredweight.

Assessment of the long-term profitability of an enterprise should include returns to owner equity

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and owner resources such as labor. The concept of opportunity cost can be used to place a value on non-purchased inputs (owner equity and resources). Opportunity cost is the value of a resource in its highest valued alternative. For example, if the pasture used in the enterprise was owned without debt, the annual cost of the pasture would be the potential rent given up annually.

The value of increased production per unit in this example is partially indicated in Tables 4 and 5. Table 4 shows profit and return to management at various average weaning weights as well as at various selling prices. The estimated selling price used in this case was $68 per hundredweight. The column labeled $68 shows the returns at various weaning weights from 430 pounds up to 600 pounds. With 430-pound calves, there would be a loss of $80.30 per cow unit; 600-pound calves would exactly break even (0 profit and return).

Table 1.

Cowcost Data Summary

1)	Total number of cows and replacements	= 100.00
	Value of breeding cow	= $ 600.00
	Value of replacement heifer	= $ 550.00
2)	Percent replacement rate	= 16.00%
	Annual interest rate	= 14.00%
3)	Number of bulls	= 3.00
	Average bull investment	= $1,500.00
	Bull salvage value	= $1,000.00
	Years of useful life	= 3.00

4) Feeds/Cow-Calf Unit

Quantity	Unit	Cost/Unit	Description
1.05	ton*	$18.91	midpregnancy
0.99	ton*	$18.91	late preg.
1.34	ton*	$30.03	lactation
8.00	acre	$ 8.00	pasture
0.35	cwt.	$20.00	mineral

*Consists of a ration mix of alfalfa hay, corn silage and oat straw.

5)	Cost of labor/Cow-Calf Unit (7 hrs. x $3.50)	= $ 24.50
	Vet and medical/Cow-Calf Unit	= $ 10.00
	Fuel/Cow-Calf Unit	= $ 3.50
	Marketing/Cow-Calf Unit	= $ 6.00
	Miscellaneous/Cow-Calf Unit	= $ 0.0

6) Buildings and equipment

Investment	Useful Life (yrs)	Interest Rate	Description
$20,000.00	20.00	8.00%	buildings
$10,000.00	10.00	9.00%	equipment

7)	Annual facilities and equipment Operating and repair costs (Estimated at 3% of total building and equipment investment	= $ 900.00
8)	Building and equipment Taxes and insurance	= $1,000.00
9)	Breeding cows death rate	= 2.00%
	Weight of cull cow (lbs)	= 1,100.00
	Market price of cull cow ($/cwt)	= $ 45.00
10)	Percent calf crop	= 85.00%
	Avg. net market weight of weaner calf (lbs)	= 450.00
	Estimated price of weaner calf ($/cwt)	= $ 68.00

Table 2.

COST SUMMARY/COW UNIT

Feed costs

Quantity	Unit	Cost/Unit	Description	Annual Cost
1.05	ton*	$18.91	midpregnancy	$ 19.86
0.99	ton*	$18.91	late pregnancy	$ 18.72
1.34	ton*	$30.03	lactation	$ 40.24
8.00	acre	$ 8.00	pasture	$ 64.00
0.35	cwt.	$20.00	mineral	$ 7.00

*Consists of a ration mix of alfalfa hay, corn silage and oat straw.

Total feed costs		$149.82
Other variable costs		
Vet and medical	$ 10.00	
Fuel	$ 3.50	
Labor	$ 24.50	
Equipment and building repairs	$ 9.00	
Marketing	$ 6.00	
Miscellaneous	$ 0.0	
interest on variable costs	$ 12.06	
Total other variable costs		$ 65.06
Less: Return from cull cow adjustment		-$ 69.30
Total adjusted variable costs		$145.58
Fixed costs		
Interest on breeding stock capital investment	$ 88.13	
Interest on buildings & equipment	$ 13.35	
Bull depreciation	$ 5.00	
Depreciation on building and equipment	$ 20.00	
Taxes and Insurance	$ 10.00	
Total fixed costs		$136.48
Total cost/cow unit adjusted for value of cull cows		$282.06

Table 3.

FINANCIAL SUMMARY

Market price/cwt. needed to cover variable costs	$46.89
Market price/cwt. needed to cover total costs of production	$90.84

Estimated profit and return to management = $-70.92/cow unit

Breakeven points at various market weights

	Market weight of weaner calf				
	430.00	440.00	450.00	460.00	470.00
Breakeven covering variable costs	49.07	47.95	46.89	45.87	44.89
Breakeven covering production costs	95.07	92.90	90.84	88.87	86.97

Return to Capital and Labor/Cow Unit* = $67.12

*The sum of:

Labor	$24.50
Interest on variable costs	12.06
Interest on breeding stock	89.13
Interest on buildings & equipment	13.35
Profit & return to management	-70.92
	$67.12

Table 4.

Profit and Return to Management at Various Prices and Weights*

Average Weaning Weight (lbs.)	$ Per Cwt.							
	64	68	72	76	80	84	88	92
430	-92.17	-80.30	-68.43	-56.57	-44.70	-32.83	-20.96	-9.09
440	-87.75	-75.61	-63.47	-51.32	-39.18	-27.03	-14.89	-2.75
450	-83.34	-70.92	-58.50	-46.08	-33.66	-21.24	- 8.82	3.60
460	-78.92	-66.23	-53.53	-40.83	-28.14	-15.44	- 2.75	9.95
470	-74.51	-61.53	-48.56	-35.59	-22.62	- 9.65	3.33	16.30
480	-70.09	-56.84	-43.59	-30.35	-17.10	- 3.85	9.40	22.65
490	-70.09	-56.84	-43.59	-30.35	-17.10	- 3.85	9.40	22.65
500	-61.26	-47.46	-33.66	-19.86	- 6.06	7.74	21.54	35.34
510	-56.84	-42.77	-28.69	-14.61	- 0.54	13.54	27.61	41.69
520	-52.43	-38.07	-23.72	- 9.37	4.98	19.33	33.69	48.04
530	-47.48	-32.85	-18.22	- 3.59	11.04	25.66	40.29	54.92
540	-43.06	-28.16	-13.25	1.65	16.56	31.46	46.36	61.27
550	-38.64	-23.46	- 8.28	6.90	22.08	37.26	52.44	67.62
560	-34.23	-18.77	- 3.32	12.14	27.60	43.05	58.51	73.96
570	-29.81	-14.08	1.65	17.38	33.12	48.85	64.58	80.31
580	-25.40	- 9.39	6.62	22.63	38.64	54.64	70.65	88.66
590	-20.98	- 4.70	11.59	27.87	44.16	60.44	76.72	93.01
600	-16.56	0	16.56	33.12	49.68	66.24	82.80	99.36

Table 5.

PROFIT AND RETURN TO MANAGEMENT AT VARIOUS CALF CROP PERCENTAGES AND MARKET PRICES*

% Calf Crop Weaned	$/Cwt.							
	64	68	72	76	80	84	88	92
70	-126.54	-116.82	-107.10	-97.38	-87.66	-77.94	-68.22	-58.50
75	-112.14	-101.52	-90.90	-80.28	-69.66	-59.04	-48.42	-37.80
80	-97.74	-86.22	-74.70	-68.18	-51.66	-40.14	-28.62	-17.10
85	-83.34	-70.92	-58.50	-46.08	-33.66	-21.24	-8.82	3.60
90	-68.94	-55.62	-42.30	-28.98	-15.66	-2.34	10.98	24.30
95	-54.54	-40.32	-26.10	-11.88	2.34	16.56	30.78	45.00
100	-40.14	-25.02	-9.90	5.22	20.34	35.46	50.58	65.70

*Based on total adjusted costs of $282.06 and a 450 lb. average weaning weight.

Table 5 shows a similar situation with various calf crop percentages and various market prices. AT $68 per hundredweight and an 85 percent calf crop, the loss per cow unit was $70.92. While even a 100 percent calf crop would not produce a profit in this case, the value of increased production is obvious. An increase to a 95 percent crop, for example, reduces the loss by $30.60 per unit.

Table 6 shows the effect on returns of **both** an increase in weaning weight and an increase in calf crop percentages. To accomplish this, the COW-COST computer program was run again, changing the input calf crop to 95 percent and the input average weaning weight to 520 pounds.

At these inputs, with costs unchanged, profit and return to management is -$2.71 per cow unit. At $68 per hundredweight, it would take an average weaning weight of 530 pounds to produce positive returns — in this case, $2.66 per unit.

Table 6.

FINANCIAL SUMMARY

Market price/cwt. needed to cover variable costs	$35.44
Market price/cwt. needed to cover total costs of production	$68.66

Breakeven Points at Various Market Weights

	Market Weight of Weaner Calf				
	500.00	510.00	520.00	530.00	540.00
Breakeven covering variable costs	36.86	36.13	35.44	34.77	34.13
Breakeven covering production costs	71.41	70.01	68.66	67.37	66.12

Estimated profit and return to management = $-2.71

Profit and Return to Management at Various Price and Weight Level

Weight	$64.00.cwt.	$66.00/cwt.	$68.00/cwt.	$70.00/cwt.	$72.00/cwt.
500.00	-29.26	-21.36	-13.46	-5.56	2.34
510.00	-24.20	-16.14	-8.09	-0.03	8.03
520.00	-19.15	-10.93	-2.71	5.50	13.72
530.00	-14.09	-5.72	2.66	11.03	19.41
540.00	-9.03	-0.50	8.03	16.56	25.09

Return to capital and labor/cow unit = $135.33

Gross income/cow unit including sales of both feeder calf and cull cow sales = $348.64

Table 7 shows the actual production per cow unit with an average 520-pound weaning weight, a 95 percent calf crop, 16 percent of the calves held as replacement heifers and the cull cow beef available from a 16 percent replacement rate with a 2 percent death loss.

Table 7.

ACTUAL WEIGHT OF BEEF MARKETED/COW UNIT

Weaner calf beef sold	=	410.80
Cull cow beef sold	=	154.00
Total pounds of beef sold/unit	=	564.80

Table 8 shows the effect on calf production per unit of alternative calf crop percentages and weaning weights.

In summary, management practices have a decisive effect on the profitability of the cow-calf enterprise. It should be recognized that the examples used here did not consider any increase in cost that may have been a part of increased production. Nor did the examples consider the differential in market price that normally occurs with differing market weights — generally, market price per pound decreases as weight increases. However, many of the most pertinent management practices require little or no increase in cash costs.

While it is obvious that increased market prices would be beneficial, the producer has very little control over market prices but a great deal of control over management practices.

The COWCOST and FEEDMIX computer programs used in this analysis are available, free of charge, (or AGNET) through local county extension service offices.

Table 8.

POUNDS OF BEEF CALF SOLD/COW UNIT AT ALTERNATIVE CALF CROP PERCENTAGES AND WEANING WEIGHTS

	Weaning Weights				
% Calf Crop	500.00	510.00	520.00	530.00	540.00
85.00	345.00	351.90	358.80	365.70	372.60
90.00	370.00	377.40	384.80	392.20	399.60
95.00	395.00	402.90	410.80	418.70	426.60
100.00	420.00	428.40	436.80	445.20	453.60

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