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Cow/Calf Analysis: Key Indicators of Profitability

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INTRODUCTION

Which of the following herds is more profitable: herd A that weans a 90% calf crop of 450 lb. calves that go on to grade 60% Choice or herd B that weans a 95% calf crop of 600 lb. calves that go on to grade 80% Choice? Obviously the question can not be answered with the information at hand. We have only the output side of the profitability equation and none of the inputs. It is likely that herd B will generate more revenue, but without knowing the costs of producing that revenue we can never know which herd is more profitable. Unfortunately, measuring costs to track true profitability in cow herds has been a difficult task. Therefore, identifying production factors that are correlated to profitability could possibly help producers make management changes to improve the financial standing of their cow-calf enterprise.

RELATIVE ECONOMIC IMPORTANCE OF TRAITS

Since our first introductory animal science course we have all been instructed that production traits have twice the relative economic importance of carcass traits and reproductive traits have ten times the relative economic importance of carcass traits. These relationships were established some time ago when costs were low and the concept of value based marketing had yet to be introduced. More recently, Melton (1995) used a bioeconomic model to compare the relative economic importance of traits for a commercial cow-calf producer versus an integrated beef firm that owns the product from conception through marketing to the consumer. For the commercial cow-calf producer, with consumption (carcass and palatability) traits set at a value of 1.0, production traits had a relative economic value of 2.87 and reproduction traits had a relative economic value of 3.24. In other words, a one standard deviation change in reproduction traits would have 3.24 times the economic impact as a one standard deviation change in consumption traits. For the integrated firm, the bioeconomic model set reproduction traits at 1.0 and showed the relative economic importance of production and consumption traits to be 9.79 and 13.52, respectively. In the integrated firm, a one standard deviation change in consumption traits had 13.52 times the economic impact of a one standard deviation change in reproduction. In the model for the integrated firm, the demand for beef was assumed to be static, thus increases in reproduction resulted in increased supply and decreased the market price. In addition, improvements in the product could be captured in improved sales at the consumer level. In Melton's model, two very important points are drawn out. First, the integrated firm had the capability of capturing three times the amount of economic benefit from genetic change as did the commercial cow-calf producer. Second, marketing time is critical to determining which traits should be included in a cow-calf producer's selection criteria. Producers who own cattle through the feedlot and onto the rail require a different set of selection criteria than those who sell at weaning. In Melton's model, the cow-calf producer that puts selection pressure on post-weaning traits, yet sells the calves at weaning will have a difficult time recouping the cost of the genetic

improvement.

FACTORS AFFECTING HERD PROFITABILITY

McGrann and co-workers (1992) related various production factors to the profitability (measured as percent return on assets) of 88 cow herds in an early IRM-SPA data set. In this study, pregnancy percentage and weaning percentage had positive relationships with percent return on assets. As reproductive performance among these herds increased so did the likelihood that they were profitable. On the other hand, average weaning weight had no relationship with percent return on assets. Herds weaning 400-, 500-, or 600-lb. calves had the same likelihood of having a positive (or negative) return on assets. This does not suggest that high weaning weights are necessarily bad, but it would indicate that efforts to maximize outputs without regard to inputs are misdirected.

Iowa researchers (1996) found that the highest profit one-third of producers in their Beef Cow Business Record program were able to wean heavier calves while reducing production costs. In a thirteen year summary of these records, reduced costs accounted for 55% of the \$233 difference in net profit between the top-third and the bottom-third of the herds. Hughes (1995) found a similar trend in his evaluation of North Dakota herds in 1994. In this evaluation the low cost one-third of the herds also had the highest weaning weights. These data would suggest that the targeting and timing of inputs to the areas in the herd where they will have the most impact is the key to economically improving herd output.

A summary of the current IRM-SPA data set for small (less than 200 cows), medium (200-499 cows) and large herds (500 or more cows) is shown in tables 1 through 4. This summary represents over 300,000 cows from 388 herds in 15 states. As seen in Table 1, net income is closely related to cost of production. In all herd size groups, net income increased as cow costs decreased. There is also a tendency for the larger herds to have higher net income per cow; however this is much more exaggerated in the higher cost quartiles reflecting the wider variation in cow costs among the herd size groups in these higher cost quartiles (Table 2). This increased variability in cow costs among smaller herds is also clearly shown in the standard deviation for costs per cow being approximately two and one-half times higher for the smaller herds. It is important to note that there is tremendous variation in cow costs within all herd size groups which indicates an opportunity for producers of all sizes to make improvements in reducing production costs.

In these herds, production traits were not highly related to net income. Neither increases in weaning percentage (Table 3) nor weaning weight (Table 4) were associated with increased net income per cow. In fact there was more of a tendency for cow costs to increase and net income per cow to decrease as the herd outputs increased. Both weaning percentage and weaning weights tended to be highest in the highest cost herds with the lowest net incomes.

Table 1. Financial net pre-tax income per cow.

Herd Size	Low Cost	Medium Low Cost	Medium High Cost	High Cost	Average
Small	112.07	55.09	(16.70)	(149.18)	0.32
Medium	121.33	68.92	33.58	(15.87)	51.99
Large	131.51	112.61	55.08	13.46	78.16
All	120.54	76.43	19.12	(61.64)	38.61

Table 2. Total financial cost (\$/cow) by quartiles.

Herd Size	Low Cost	Medium Low Cost	Medium High Cost	High Cost	Average	Standard Deviation
Small	260	376	462	723	455	108.24
Medium	275	353	419	541	397	44.40
Large	217	309	377	511	353	41.60
All	251	349	424	606	408	92.21

Table 3. Weaning rate (%) by cost quartiles.

Herd Size	Low Cost	Medium Low Cost	Medium High Cost	High Cost	Average	Standard Deviation
Small	84.07	84.46	84.04	88.36	85.23	9.31
Medium	84.82	80.75	85.84	85.45	84.22	7.55
Large	77.81	84.31	85.38	83.12	82.66	6.60
All	82.39	83.37	84.95	85.93	84.16	8.34

Table 4. Pounds weaned per calf (lbs/calf) by cost quartiles.

Herd Size	Low Cost	Medium Low Cost	Medium High Cost	High Cost	Average	Standard Deviation
Small	479	502	528	546	514	78.48
Medium	500	518	504	546	517	77.26
Large	481	495	503	515	499	60.90
All	485	505	514	536	510	78.48

UNIT COST OF PRODUCTION

Unit cost of production (the costs required to produce a hundred pounds of weaned calf) has been identified as a critical factor in herd profitability (Hughes, 1995). As unit cost of production (UCOP) decreased, percent return on assets and profitability increased (McGrann et. al., 1992). Unit cost of production is a critical factor because it considers both the inputs and outputs of the cow-calf enterprise. Unit cost of production is sensitive to production parameters as well as costs. Neither low costs nor high performance ensure a low UCOP. A herd that weans 400 lb. calves with costs of \$280/cow has the same \$70/cwt. UCOP as a herd that weans 600 lb. calves but has costs of \$420/cow.

In the current IRM-SPA summary, unit cost of production, calculated as the total financial cow costs divided by the pounds of calf weaned per cow exposed, is also highly associated with increased profitability. In all herd size groups, the cost quartile groups with the lowest cow costs had the lowest unit cost of production and the highest net income per cow (Table 5).

Table 5. Total financial cost per pound weaned (\$/lbs).

Herd Size	Low Cost	Medium Low Cost	Medium High Cost	High Cost	Average
Small	0.660	0.887	1.018	1.484	1.035
Medium	0.648	0.840	0.986	1.156	0.955
Large	0.588	0.737	0.846	1.195	0.850
All	0.634	0.829	0.957	1.308	0.946

These data would all suggest that producers should develop strategies to lower unit cost of production. These strategies could entail lowering costs without sacrificing performance, reallocating expenses to increase productivity without increasing costs, or in some situations even increasing costs to improve a substantially below average area of performance. This situation is most likely to occur if reproductive performance is well below average and an economical solution can be found. Whatever the strategy, it appears imperative for cow-calf producers to KNOW and REDUCE their UNIT COST OF PRODUCTION in order to improve the profitability of their herds.

IMPACT OF POST-WEANING PERFORMANCE

There is currently a great deal of interest and emphasis on measuring the feedlot performance and carcass merit of individual cattle and tracing this information back to their mother cows. This is outstanding information that can certainly help improve the quality and efficiency of beef production. However, care must be taken when this data is used as the sole criteria for making culling decisions in the cow herd. In integrated beef enterprises, feedlot profitability represents only a portion of the overall profitability of the enterprise. Colorado

researchers (Lankister et. al., 1997), evaluated the critical points in determining profitability of ten ranches that retained ownership and marketed fed cattle in 1995. On eight of the ten ranches, the cow-calf phase of production had a greater impact on overall profitability than the feedlot phase. Since 1995 was a year of high feed grain prices and low fed cattle prices the researchers reanalyzed the herds using average feed and market prices for the region. Under these conditions more of the herds made an overall profit, yet in nine of the ten herds profitability was still more highly influenced by the cow-calf phase than by the feedlot phase.

Producers should also be aware that feedlot performance of individual cattle in a herd is often inversely related to their preweaning performance. Lighter weight calves at weaning, that likely have a higher unit cost of production within the herd, often compensate with higher feedlot performance. In an unpublished data summary, carcass weight was determined to be highly related to feedlot profitability; however, carcass weight is also correlated with larger cow size which would result in higher maintenance costs in the cow herd. Both pre- and post-weaning performance of offspring as well as several input or cost factors need to be considered when culling the cow herd.

SUMMARY

No production or reproduction traits show a consistent relationship to profitability in cow herds. Data would indicate a threshold for outputs from a cow herd. If outputs are below that threshold, management changes to increase productivity will have a good chance of increasing profitability. However, if outputs already exceed the threshold, increased inputs to attempt to raise outputs will likely not be cost effective. Unit cost of production, or the cost per hundredweight of beef produced, considers both the inputs and outputs of a cow herd and has consistently been related to cow herd profitability in numerous studies. Producers who are interested in improving the profitability of their cow herds need to have an accurate measurement of the costs per hundredweight of beef produced in their herds as well as an understanding of the input and output components of the unit production costs. These producers can then implement management strategies that are appropriately targeted at either the cost or production side of the equation to lower the unit cost of production for their herds.

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