

# Financial Performance of North Dakota's Beef Cow Enterprises – The Critical Success Factors

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## Introduction

In the simple business world of the past, financial performance of the beef enterprise was highly correlated with herd performance. Beef farmers could assume that if they managed their production well, financial performance of the business would automatically follow.

A recent survey of Oklahoma cattlemen identified four major performance criteria used by cow-calf producers to predict performance of their cattle. The four criteria identified were: 1) weaning weight, 2) birth-to-weaning average daily gain, 3) calf health, and 4) calf death rate.<sup>1</sup> All four selected criteria are herd performance oriented.

Farm business management research is now looking beyond just production to explain the farm to farm variation in profits.

Recent farm business records research is suggesting that in the 1980's more than just high production is separating the high profit farms from the low profit farms.<sup>2</sup>

Research is suggesting that other management factors, in addition to those measuring herd performance, are also important determinants of profitability.

Resource use and cost control appear to be major contributors to profitability. High profit farms seems to experience lower production costs and substantially higher production efficiencies. High production efficiency implies high output coupled with lower input.

Today, beef farming and ranching is a dynamic and highly competitive business. The increased financial risks associated with the larger investments, narrower profit margins, and greater specialization are forcing astute beef farmers and ranchers to enhance their financial management skills.

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As we end the decade of the 80's, astute beef farmers and ranchers are asking animal scientists and economists to identify those management factors that will help ensure their financial survival in the 1990's. Their concern is that having good production skills will no longer ensure financial survival of the beef cow business in a global economy.

## Purpose

The purpose of this publication is to provide astute cattlemen with some suggested Critical Success Factors (CSF) that should help ensure financial survival of a beef farm or ranch in the 1990's. Once the CSF's are identified, Integrated Resource Management (IRM) teams can turn their integration efforts toward designing a comprehensive on-farm Integrated Resource Management Information Systems that routinely monitor these Critical Success Factors for individual beef farms and ranchers.

## Low Cost Producers

USDA survey data suggests there are significant economies of size in the nation's beef cow operations and that lower production costs tend to be associated with the larger cow herds. Table 1 present five economic measures that USDA calculated for three herd sizes over a three year period.

The medium sized herds (100-499) had the highest gross value of production per cow and the largest herds (over 500 cows), on the other hand, had the lowest gross value of production. In the minds of many, high gross value of production implies high profitability.

Cash costs of production presents a different story. The smallest herds clearly have the highest cash costs of production per cow while the largest herds have the lowest. Even though the large herds have lower gross returns per cow, they have even lower production costs. The net result is that the largest herds have the highest net cash income.

The USDA data suggest that net cash return is not highly correlated with maximum production. This, in turn, implies that those herds with maximum production may or may not be the herds with maximum net cash return. IRM

Table 1. USDA Costs &amp; Returns Summary of Production Per Cow For Alternative Beef Cow Herds

ITEM	< 100 COW HERDS			100-499 COW HERDS			>500 COW HERDS		
	1985	1986	1987	1985	1986	1987	1985	1986	1987
GROSS VALUE OF PRODUCTION	253	262	316	262	274	314	246	262	300
COST OF PRODUCTION	295	254	274	262	229	238	209	197	201
NET CASH RETURN	-42	7	42	0	45	77	37	65	99
FULL ECONOMIC COSTS	527	489	515	409	368	380	334	279	280
RETURNS TO MGT & RISK	-237	-227	-199	-148	-94	-65	-88	-17	20

1/ Source: "Economic Indicators Of The Farm Sector Costs Of Production 1987", USDA ERS ECIFS 7-3, Febr 1989.

teams need to take a cautious approach in their emphasis on maximum production per cow.

Even though many cattle producers utilize net cash return as a measure of profitability, profitability needs to be based on full costs of production rather than cash costs of production. Full economic costs of production include cash and non-cash costs. Under full costs of production, resources are valued based on their opportunity costs (the value in their next best use) rather than being valued at their cash costs. For example, farm raised feeds need to be valued at their market price which is frequently more than their cash costs of production. If your neighbor will pay \$50 per ton for your hay, your cows have to pay \$50 for the hay consumed. In full costs of production, all resources are valued at their opportunity costs. A negative return over full economic costs indicates that the resources used are not earning as much as they could in their next best use.

If earnings on equity resources (operator and unpaid family labor, management, and equity capital) are less than the family living draw, net worth is being reduced. Losing net worth for a year or two does not mean that one cannot farm. A beef farm business losing net worth can continue to operate until the net worth is used up. A typical beef farmer can take several years, if necessary, to reverse the direction of net worth.

Agriculture's variable income makes it almost impossible to increase net worth each and every year. The key is the multi-year trend in net worth. The key to long-run survival, should net worth start trending downward, is to take note of early warning signals and make a management cor-

rection so that net worth starts to increase. Many managers of the 1980's were let down by their lack of financial business records as they never received the early warning signals associated with net worth reduction.

While the large herds have a lower gross value of production per cow, they apparently have even lower cash costs of production. The net result is that the large herds have the highest net cash income per cow. When full economic costs are taken into account, the USDA data suggest that the economic advantage of the largest herds is even greater. These USDA data suggest that any set of Critical Success Factors should take into account: (1) the total value of production, (2) direct and indirect costs and (3) the number of cows.

#### Management Does Make a Difference

Selected commercial beef-cow producers in North Dakota participated in a state-wide farm business record analysis program operated by the North Dakota's Adult Vocational Agriculture Program. Participating farmers pay an annual service fee and receive individualized farm management and financial management education and service. The resulting farm business management records are summarized in a state-wide year-end farm business management summary.

Participant's data are summarized into three profitability groups -- the 20 percent least profitable, the 20 percent most profitable and the middle 60 percent of commercial beef-cow farms. Some of the key performance

Table 2. North Dakota's Commercial Beef Cow Herds (1988)

ITEM	20% LEAST PROFITABLE	MIDDLE 60%	20% MOST PROFITABLE
AVERAGE NUMBER OF BEEF COWS	80	87	83
AVERAGE CALF WEIGHT SOLD OR TRANSFERRED	497	496	573
PRICE PER CWT CALVES SOLD	\$87.33	\$90.42	\$84.13
POUNDS OF BEEF PRODUCED PER COW	396	487	585
TOTAL VALUE OF PRODUCTION	\$363	\$429	\$549
FEED FED:			
GRAIN (BU BARLEY EQUIVALENT)	5.39	4.91	5.20
PROTEIN, SALT, MINERAL (\$)	\$32.29	\$39.31	\$42.24
FORAGE (TONS HAY EQUIVALENT)	4.35	3.38	2.72
PASTURE COST (\$/COW)	\$60	\$54	\$58
TOTAL FEED COST (\$/COW)	\$248	\$199	\$169
RETURN OVER FEED COSTS (\$/COW)	\$114	\$229	\$380
RETURN PER \$100 FEED FED	\$146	\$215	\$325
OTHER DIRECT COSTS:			
MISCELLANEOUS LIVESTOCK EXPENSE	\$6.70	\$7.71	\$11.89
VETERINARY EXPENSE	\$9.89	\$9.20	\$11.93
CUSTOM HAULING, MARKETING, ETC.	\$9.51	\$0.00	\$4.34
SPECIAL HIRED LABOR	\$0.00	\$4.98	\$7.41
SUB-TOTAL	\$26.10	\$21.89	\$35.57
ALLOCATED COSTS:			
POWER AND MACHINERY	\$11.12	\$11.10	\$9.03
LIVESTOCK EQUIPMENT	\$5.01	\$4.65	\$2.48
BUILDINGS AND FENCES	\$5.15	\$6.39	\$4.29
SUB-TOTAL	\$21.28	\$22.14	\$15.80
UTILITIES & OTHER GENERAL FARM EXPENSES	\$15.05	\$11.10	\$22.37
TOTAL COSTS*	\$311	\$254	\$243
III. Animal Health:			
PERCENT DEATH LOSS	5.0	4.6	3.7
PERCENT CALF CROP BORN	97.56	97.75	100.0
PERCENT CALF CROP WEANED	93.90	94.38	97.53
PERCENT CALF DEATH LOSS	5.0	4.6	3.7
RETURNS TO OPERATOR AND FAMILY LABOR, MANAGEMENT & ALL CAPITAL	\$52	\$175	\$306

\* includes utilities & other general farm expenses

and financial indicators from the 1988 report are summarized in Table 2.

Please note that 1988 was a year of serious drought throughout most of North Dakota. The impact of the drought shows up in lighter than normal average weaning weights due in part to earlier weanings. The drought also resulted in higher dry lot feed requirements due to longer winter feeding programs, poor quality forages, and higher wastage associated with these poorer forages.

Returns to operator and unpaid family labor, management, and all capital will be referred to in this paper as Profit & Loss (P&L). P&L in this paper includes a returns to all investment capital because there is no way to separate out borrowed and equity capital within the beef enterprise.

Analysis suggests that North Dakota's beef farmers' earned P&L varied substantially from one profit group to the other (see bottom line, Table 2). In 1988, the average group earned a \$175 P&L per cow. The high profit farms earned a \$306 P&L per cow and the low profit beef farms earned a \$52 P&L per cow. The high profit farms earned \$254 higher P&L per cow than the low profit farms.

Even with higher physical production, the high profit beef farms had lower per unit costs of production. Part of this lower cost was due to increased beef produced per cow and part of it was due to lower resource use. Somehow, these high profit beef farms and ranches use less physical resources to produce more beef.

#### Time Series Analysis of North Dakota Beef Farms

This section will concentrate on a time series analysis of North Dakota beef farms records compiled over the eleven year period from 1978 through 1988. This eleven year period was selected to cover the cattle price cycle from peak prices in 1978/79 through peak prices in 1988/89. This eleven year period allowed a full spectrum study of production and economic factors associated with a price cycle and their influence on the financial performance of beef farms during one complete cattle cycle.

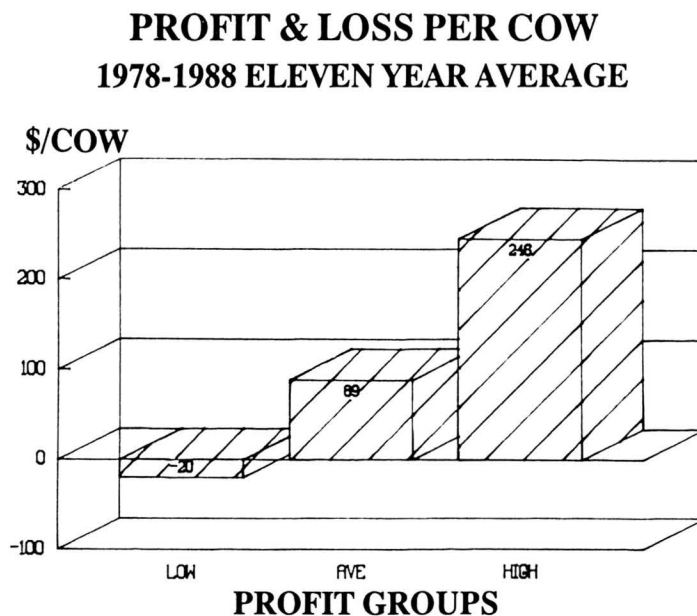
#### Critical Success Factors for the Beef Cow Enterprise

Research based on North Dakota's Farm Business Records indicates that the profitability of beef cow enterprises varies considerably from one year to the next. These business records suggest that North Dakota's average beef cow herds earned \$89 P&L per cow over the eleven year study period (see Figure 1). During the same 11 year period, the 20 percent high profit herds averaged \$245 P&L per cow. The 20 percent low profit beef herds, on the other hand, averaged a negative \$20 P&L per cow over this 11 year period. The difference in P&L between the high and low profit farms was \$265 per cow.

This eleven year analysis leads to the same conclusion

that we reached from the 1988 beef farm study. Somehow, high profit farms are able to consistently generate more profit from their resources than can the low profit farms.

Figure 1. Eleven Year Average Earned Profit & Loss For North Dakota Beef Farms



#### Earned Profit & Loss (P&L) for the Last Cattle Cycle

The difference in earned Profit & Loss (P&L) among North Dakota beef farmers is further illustrated in Figure 2. The first 11 bars of Figure 2 illustrate the average farms' earned P&L from the beef enterprise for the eleven year period. The second 11 bars illustrate the low profit farms' P&L and the last 11 bars illustrates the high profit farms' earned P&L. The cyclic impact of the price cycle over this 11 year period is clearly present in all three profit groups.

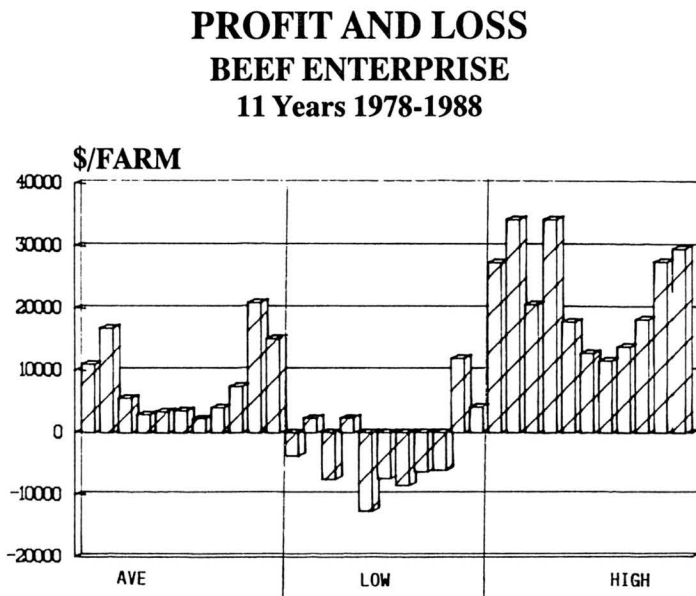
During the eleven years, the high profit herds earned an average of \$159 more P&L per cow per year than the average herds. Over the 11 year period, the high profit farms accumulated \$1727 more P&L earnings per cow than the average profit herds. If the time value of money would have been taken into account, this additional earnings would be even higher.

Even when prices were at their lowest, the high profit farms were constantly able to earn a positive P&L. The same cannot be said for the low profit farms. The low profit farms earned an average of \$109 less P&L per cow than the average herds. Over the 11 years studied, accumulated to \$1199 less P&L earned per cow. The accumulated earned P&L difference between the high and low profit farms over this 11 year period was \$2926 P&L per cow.

Let me further emphasize the importance of management. During this eleven year period the high profit herds earned \$269,000 P&L per herd than did the low profit

herds. If these data are expanded to the State's 830,000 beef cows and if the low and average profit farms were to increase their production efficiencies to the level of the high profit farms, North Dakota's beef farms would generate another \$122.3 million dollars in earned P&L per year. Based on the commonly used 3.07 multiplier, this \$122 million dollars would have a \$375 million dollar economic impact on the State's total economy. Yes, management could make a big difference in North Dakota's beef industry and North Dakota's economy.

Figure 2. Annual P&L for North Dakota Beef Farms Sorted Into Low, Average, and High Profit Beef Herds



#### Identification of Critical Success Factors

In order to identify and quantify Critical Success Factors (CSF) associated with operating a profitable beef enterprise, the 11 year enterprise summaries with three profit levels were submitted to statistical analysis. Total beef cow enterprise Profit & Loss was specifically analyzed in this study with the goal in mind to explain the farm to farm variation in earned P&L.

The analytical approach utilized in this time series analysis is the familiar elasticity concept commonly employed in economics. Profit elasticity coefficients, defined as the percentage change in profits resulting for a one percent change in individual production factors, were calculated. Those factors with the highest profit elasticities were nominated as possible Critical Success Factors

This elasticity approach identified: 1) Forage disappearance, 2) veterinary expenditure as a proxy for "cost of disease", 3) gross dollar production per cow, 4) high management ability, 5) total feed cost, 6) number of cows in the

herd, 7) selling price of calves and 8) weaning weight as possible Critical Success Factors.

Further analysis of these potential CSF factors narrowed the list down to five factors that, when combined, explained 77.5 percent of the variation in the average earned P&L for North Dakota's beef-cow enterprise farms. The final five Critical Success Factors identified in order of importance were: 1) total feed costs, 2) selling price of calves, 3) number of cows in the herd, 4) total pounds of beef produced per cow (not just calf weaning weight)<sup>3</sup>, and 5) the cost of sickness. None of these variables include the use of debt capital due to data limitations or amount of borrowed capital used in the beef enterprise.

The statistical relationship relating these CSF's to P&L in the beef enterprise is presented in equation (1). All dependent variables are expressed in total beef-cow enterprise values rather than on a per cow basis.

$$(1) \quad P\&L = -29724.10 \\ \text{plus } 18.85^*(\text{no. cows}) \\ \text{plus } 555.92^*(\text{selling price of calves in } \$/\text{cwt}) \\ \text{plus } 0.91^*(\text{total pounds of beef produced}) \\ \text{minus } 2.48^*(\text{total feed costs}) \\ \text{minus } 6.18^*(\text{total cost of sickness})$$

where P&L is the total beef enterprise dollar returns to operator labor, management, and all capital. This "all" capital assumption implies that this analysis was conducted under the assumption of debt free herds.

The R Squared value was 77.5 percent indicating that 77.5 percent of the variation in P&L can be explained by the five CSF's. This, in turn, implies that 22.5 percent of the variation in P&L is explained by other than these five factors.

This equation suggests that, on the average, P&L will increase \$18.85 per additional cow added to the herd. This is not extremely high and suggests that cow numbers is not a dominant determinant of profits in North Dakota. Why would North Dakota data indicate that cow numbers are not very important when the USDA data suggests strong economies of size? The answer is that the North Dakota data dealt with 11 years of group averages and most of the observations studied were under 100 cows. Studies on the economies of size need to be performed on individual beef farm data and not group averages. A follow up study is needed to analyze the economics of size question in North Dakota.

A one dollar increase in calf selling price will increase total enterprise P&L \$555 for the averaged sized herd. This suggests that market price received is critical and that

<sup>3/</sup> Weaning weight, while it is taken into account in total pounds of beef produced, accounts for only 67 percent of the total beef pounds sold in a typical beef cow herd raising replacements. Weaning weight accounts for even less than 67 percent of the total beef sold in an expanding herd.

marketing (at least the pricing function) makes a difference.

Total pounds of beef produced, both from additional weaning weight and additional cull weight, is projected to add \$0.91 to P&L per pound of beef sold. The magnitude of the regression coefficient suggests that total pounds of beef produced is a proxy for multiple production factors.

Total feed costs are negatively related to P&L in that a \$1.00 increase in feed costs implies a \$2.48 reduction in P&L. This value suggests that feed costs serve as a proxy for overall production efficiency. The lower the feed costs, the higher the production efficiency.

P&L is projected to decrease \$6.18 for every dollar spent on cost of sickness. The negative coefficient suggests that P&L goes down with the occurrence of sickness. The negative \$6.18 also suggests that once sickness is responded to in the herd, that the measured dollar impact of the sickness is 6.18 times the vet and medicine bill used to try and combat the sickness.<sup>4</sup>

I suspect that the biggest surprise to most North Dakota cattlemen with respect to these five CSF's is the fact that total feed costs was identified as the number one CSF. My budgets for producing next year's calf crop suggests that it will cost at least \$195 to feed a cow this winter and pasture a beef cow this next summer. Feed costs are projected to account for 69 percent of the total costs of producing a calf crop weaned in 1990. It really should not be surprising to find that feed cost is the number one Critical Success Factor.

I suspect that many cattlemen and scientists feel that weaning weights should have been the number one Critical Success Factor. Weaning weights, however, account for approximately 67 percent of the pounds of beef sold from a typical beef cow herd. The remaining 33 percent of the pounds sold comes from cull cows, cull heifers, and cull bulls.

As weaning weights are increased, the marginal price per pound of calf decreases. While the per pound price of additional weaning weight normally decreases, the marginal cost of additional weaning weight normally increases. Maximum profit is at that weaning weight where marginal cost of additional weight equals the marginal price of the additional weights. Maximum Economic Yield (MEY) may well be at a weaning weight below maximum biological weight.

I am proposing that our IRM management information system for the 1990's include total pounds of beef produced from the cow herd. This appears to be a better indicator of profits. Weaning weights, while less of a profit indicator, may well be needed to evaluate the productivity of cows; therefore, both production measures may be

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4/ A second component of the "cost of sickness" is the unmeasured impact of animal sickness. To date, we have not figured out a way to document this component of the "cost of sickness".

needed to meet the integrated management needs of beef farmers.

## Implications for North Dakota's Integrated Resource Management Program

### Task Force Report Sets the Stage

A recent NCA Task Force shocked the beef cattle industry when they suggested that packer concentration was not the source of low returns to beef producers. Rather, the task force suggested that the principal reason that beef is losing out to other meats is that beef's cost is rising relative to the cost of other meats.<sup>5</sup>

The Task Force suggested that beef cow herds needed to get larger to take advantage of economies of size. Rather than confirming packer concentration as a problem, insufficient cow-calf concentration was identified as a problem.

Cattlemen, on the other hand, are suggesting that they are adopting recommended best management practices (RBMP) and technologies as rapidly as they can. These technologies and RBMP surely have reduced production costs as much as possible!

USDA survey data for 1985, 1986, and 1987 suggest that there are substantial economies of scale in beef cow operations. (This is probably some of the data that the NCA Task Force examined.) USDA data show that those herds above 500 cows are producing beef at lower costs. It is my untested hypothesis, however, that the apparent economies of scale may be a geographical factor. Production cost in the Western states maybe less than in the Great Plains, Mid-West and South Eastern farming states.

My study of North Dakota farm business records suggests that both the cattlemen and the Task Force are right. First, 1988 farm business records suggest that 20 percent of the beef farmers operate very efficient beef cow enterprises, are experiencing low costs of production and are producing a good profit from the beef cow enterprise. This supports the cattlemen's position. Profits are obtained from both high production and efficient resource utilization.

My study goes on to suggest that there is another 20 percent of North Dakota's beef farms that appear to be much less efficient and are utilizing considerably more resources to produce beef. This supports the Task Force's position. There is another 60 percent of North Dakota's beef farms that are operating in between these two groups and probably do not support either of the two positions.

If North Dakota's beef farm profits are typical of beef farms and ranches in the nation, cow-calf producers may be the link in the production chain with considerable room to reduce costs of production. If the production efficiency of the low profit and average profit farms were to be enhanced to match the production and efficiencies of the

high profit farms, North Dakota's cow-calf industry will have done its part to make beef a more competitive industry. Implementing a state-wide Integrated Resource Management System is the first step in meeting the industry challenge outlined by the NCA Task Force.

#### Economics Has to be Part of Technology Evaluations

The beef industry has a fairly poor record of applying available technology. The NCA Task Force believes that there should be fewer and larger operations so more technology can be applied and costs can be lower through economics of size.<sup>8</sup>

Economics is playing an ever increasing role in technology adoption. Beef farmers' decisions to adopt new technologies and/or to adopt recommended best management practices (RBMP) have to be based now on two conditions. First, there has to be a positive biological response and, second, there has to be a favorable economic response.

Today, not all new technologies and RBMP's enhance profits. As economic conditions change during the cattle cycle, the profitability of new technologies and RBMP's will change. This implies that beef farmers have to continuously evaluate the economics of production technologies and RBMP's. Just because a given technology or RBMP's was not profitable at a given point in time does not mean that it will always remain unprofitable. Astute beef farmers will continuously be evaluating new technologies and RBMP's in an attempt to increase beef farm profits.

Herd performance records can be used to document the on-farm biological response of new technologies and recommended best management practices (RBMP's). Financial management records can be used to document the on-farm economic response. The problem is that many of today's beef farm managers lack one or both of these management information systems.

#### Early Warning System Not in Place During the Eighties

Farm business records suggest that approximately 20 percent of North Dakota farmers were not covering full economic costs during the first half of the 1980's. The State's financial crisis surfaced in the 1984-1986 time period when many of these low profit farms had used up their existing net worth. Had these farmers calculated their returns over full economic costs, most of these farmers would have received a red-flag signal as early as 1980 or 1981 that their farm businesses were in deteriorating financial conditions. During the 1980's, many farmers were simply let down by their on-farm management information systems.

A management system that uses production as a proxy for financial performance will not meet the need of astute

cattlemen in the 1990's. I challenge my research and extension colleagues that we need to start designing an IRM Information System designed for the 1990's.

#### IRM Information System for the Nineties

An IRM Information system of the 1990's will need to integrate both the biological and economic responses into one integrated management analysis that generates integrated management signals. Our piece meal on-farm management information systems of today have significant information gaps and will not meet the management needs of tomorrow's astute beef producer. Beef farmers sure were let down by the inadequate on-farm management information systems in place during the 1980's! I hope that we do not make that same mistake in the 1990's.

Iowa State University has introduced an integrated management system that combines both financial and production data into one management information system. New York is in the process of launching a similar system. Let me summarize Iowa's results with a published quote:

"Results of a 1988 survey showed that producers having been on Iowa's Beef Cow Records Project for four or more years had net profits 2.8 times greater than first year participants."<sup>9</sup>

Iowa's experience suggests that an integrated approach to management information systems has big pay off for beef farmers.

My study suggests that North Dakota has considerable room for improvement in our beef cow operations. The high profit farms have demonstrated that it can be done. IRM's challenge is to transfer the critical management practices to the remaining 80 percent of North Dakota's producers.

#### Summary

Astute beef farmers and ranchers are asking animal scientists and production economists to identify those management factors that will help ensure their financial survival in the 1990's. The purpose of this publication is to provide these astute beef farmers and ranchers with suggested Critical Success Factors (CSF's) that help ensure financial survival of a beef farm or ranch.

Three different data sets were analyzed in an attempt to identify Critical Success Factors for beef farmers and ranchers. The first data set was a USDA survey of beef farmers and ranchers throughout the nation covering 1985, 1986, and 1987. This data set suggested strong economies of size for herds of 500 cows and larger.

The second data set used was North Dakota's Farm Business Summary for 1988. This data suggested wide difference in beef produced per cow among the three profitability groupings. Profit for the high efficient herds was

substantially higher than for the remaining herds. Somehow, the high profit group can produce more beef with less resources.

The third set of data was a time series of North Dakota's Farm Business Summaries covering this last beef price cycle. This 11 years of data suggested that the five Critical Success Factors (CSF's) for North Dakota beef farms are: 1) total feed costs, 2) selling price, 3) number of cows in the herd, 4) total pounds of beef produced per cow, and 5) the cost of sickness.

Profit in the beef cow enterprise appears to boil down to management. While we all would like to buy management in a medicine bottle or in a new technology, management boils down to "paying attention to detail". My analysis suggests that the high profit managers in North Dakota earned \$269,000 more P&L per herd in the last 11 years than were earned by the low profit managers.

If North Dakota's proposed IRM teams could increase production efficiency of the low 80 percent producers to the production efficiencies of the top 20 percent of our producers, North Dakota's beef farmers would generate another \$122.3 million net income per year. Utilizing a 3.07 multiplier, this implies an \$375 million dollars of additional economic activity in North Dakota. Yes, paying at-

tention to detail can make a difference.

I recommend that an on-farm Integrated Resource Management Information System be developed for the 1990's that incorporates these five CSF's of forage production covered in a second paper at this conference and the CSF's of herd performance also covered in a third paper at this conference. Together, a management information system that integrates these three sets of Critical Success Factors should provide an IRM Information System that will take North Dakota beef farmers and ranchers into the Twenty-First Century.

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