1975

Evaluating Net Return in Beef Cow-Calf Enterprises

C. A. Dinkel
South Dakota State University

South Dakota State University
Brookings, South Dakota

Department of Animal Science
Agricultural Experiment Station

A.S. Series 75-43

Evaluating Net Return in Beef Cow-Calf Enterprises

C. A. Dinkel

Most research reports are directed toward the improvement of only one or a few of the important traits influencing efficiency of beef production. This is brought about because experiments of a given size can only study a limited number of variables at one time. It has become increasingly apparent that the effects of combining these experimental results must be considered in the application of research results on individual ranches. This has led to the concept of systems research and development of decision-making computer programs. These programs can assist the rancher in making such decisions as choice of management tools, choice of breed and choice of breeding system. The objective here is to outline such a program and to indicate areas of future efforts of this kind.

The primary application of this program is in the commercial cow-calf operation, but the requirements indicated by the program for the cow-calf producer should be important in determining the goals of registered cattle operations. These goals may well vary with each breed and each locality.

The efficiency of beef production might be characterized by the following basic equation:

$$\begin{matrix}\text{Carrying}\\\text{Capacity}\end{matrix} \times \begin{matrix}\text{Reproductive}\\\text{Rate}\end{matrix} \times \text{Livability} \times \begin{matrix}\text{Weaning}\\\text{Weight}\end{matrix} \times \text{Price} - \text{Costs} = \text{Net Return}$$

As written the equation represents net return at weaning. This can be better visualized by considering that carrying capacity times reproductive rate gives number of calves at birth and this multiplied by livability gives number of calves weaned. Multiplying this by weaning weight gives total pounds of calf at weaning which, when multiplied by the price per pound, gives total return. Subtracting costs of production yields net return. This same basic formula may be used at later stages. For example, by substituting livability and final weight in the feedlot and changing costs of production to include postweaning costs, net return from the feedlot can be obtained. The same basic equation could be used for net return from sale of retail cuts by substituting pounds of retail cut yield per animal, the new price and associated costs of production.

There has been a tendency over the years to overemphasize some of the individual factors involved in this equation. Perhaps the one overemphasized for the longest time has been price per pound. The concept of "topping the market" to some producers has become the absolute goal without regard to net return. This has been true of the cow-calf man but perhaps to a greater extent of the feedlot operator. Recently a producer complained that his heavier calves

Prepared for Cow-Calf Field Day, Aberdeen, South Dakota, November 13, 1975.

were sorted off and sold for 7 cents a pound less, but had he figured his return he would have realized that he gained $13 per head on the heavy calves in spite of the reduced price per pound. In another instance a feedlot operator was proud of a premium of a dollar per hundred over market top for his heavy weight, kosher type beef, but he had not stopped to consider that he was spending $2.85 for every $1 premium received.

In recent years there has been considerable discussion regarding carrying capacity and especially the effect of cow size upon this variable. Some evaluations have disregarded the correlated effects of cow size on weaning weight, postweaning gain and price per pound.

Reproductive rate has been emphasized and perhaps overemphasized through statements such as reproduction is most important since there can be no return without a calf. This implies that reproductive rate is either zero or one. The equation above indicates that reproductive rate is limited to values of zero or one only if carrying capacity is one. This is a situation in which we are not particularly interested. Reproductive rate will usually have extreme limits of perhaps 65 to 100% with more usual limits of 75 to 90%.

These examples indicate some of the dangers in overemphasizing any one trait or considering only one or a few of the factors involved in the equation. The comments are intended to emphasize consideration of all factors in balance. With regard to the first five factors, it appears very difficult for one of them to be ranked more important than another when they all multiply each other. Saying that one is twice as important as another does not appear mathematically sound, since that two also multiplies each of the other factors. For example,

$$\begin{matrix}\text{Carrying} \\ \text{Capacity}\end{matrix} \times \begin{matrix}\text{2 Reproductive} \\ \text{Rate}\end{matrix} = \begin{matrix}\text{2 Carrying} \\ \text{Capacity}\end{matrix} \times \begin{matrix}\text{Reproductive} \\ \text{Rate}\end{matrix}$$

This is perhaps an oversimplication, but it may be nearer the truth than the other overmagnification.

If one of these five factors does not vary but is essentially a constant from one comparison to another, then that factor will not cause important differences between management systems or crossbreeding systems or whatever is being compared. Conversely, a factor that varies considerably can cause large differences. If one of the factors is more easily improved than another, then that factor should be given increased attention and thereby may become more important. Also, units of the factors may have different relative costs. For example, this simple equation does not take into account the fact that lowered livability has a greater cost than lowered reproduction if dry cows are removed at weaning time.

This discussion should serve to indicate the need to emphasize and to improve all five of the factors and the costs of production. It should also serve to emphasize the complexity of the interrelationships among the factors determining net return.

To further demonstrate and analyze these interrelationships, some of the contributing causes of differences are indicated in the arrow diagram, figure 1. The plus and minus signs associated with each arrow indicate the direction of the relationship but do not necessarily indicate advantage or disadvantage. For example, a minus sign indicates that as one trait goes up the other goes down, but there are cases where this is an advantage as well as cases where this is a disadvantage. The degree of the relationship is not indicated. For example, cow size has a negative relationship to carrying capacity. This tells us that as cow size increases carrying capacity will decrease if feed supply is constant and limited. This is a fairly strong relationship since we know that it takes more feed to maintain larger cows. On the other hand, the negative relationship between cow size and female fertility is not as strong a relationship. There is some tendency for fertility to decrease as cow size increases under a constant feed situation, but the relationship is probably not as strong as between cow size and carrying capacity. Likewise, the negative relationship between cow size and livability is probably not as strong as that between cow size and carrying capacity. The positive relationship between cow size and weaning weight is fairly strong and consistent. Recent research results indicate the extra pounds of calf produced by larger cows pay for the increased maintenance of that larger cow. The negative relationship between cow size and cost of production is one example of an advantageous negative relationship. This decrease in cost of production associated with increased cow size comes through lowered variable costs such as personal property taxes on cows, veterinary costs and other costs that vary with the number of cows maintained.

These relationships with cow size are somewhat continuous with corresponding changes occurring as cow size changes over the normal range of weights. In recent years over much of the central part of the country, feeder calf price has been affected by cow size also but in a less continuous manner. That is, calves from moderate to large cows have tended to sell at the same price while calves from small cows have been discounted. In our part of the country this has usually been a discount of 6 to 7 cents per pound with reports running up to 10 cents per pound in Oklahoma. These prices in combination with the lowered weight represent an economic loss to the cow-calf producer.

Milk production is negatively related to female fertility and carrying capacity in a limited feed situation and is positively related to weaning weight. Increases in milk production may be expected to lower carrying capacity and reproductive rate in limited feed situations, but associated increases in weaning weight may also be expected.

Some examples of the application of this equation may better demonstrate its utility. The comparison of a breeding group of 2-year old heifers averaging 800 pounds and milk production of 1500 pounds with another group averaging 865 pounds and milk production of 3000 pounds indicates the carrying capacity would be only 83 head of the heavier, higher producing breed group where we could carry 100 head of the smaller, lower producing group (table 1). Assuming first that all other factors in the equation are equal, we come up with a gross return in favor of the smaller breed of about $2,000. Using variable costs per cow of $100, which was typical of an average operation in South Dakota in the fall of 1974, this difference in gross return is essentially wiped out in the net return. This comparison is not very practical since we have not considered

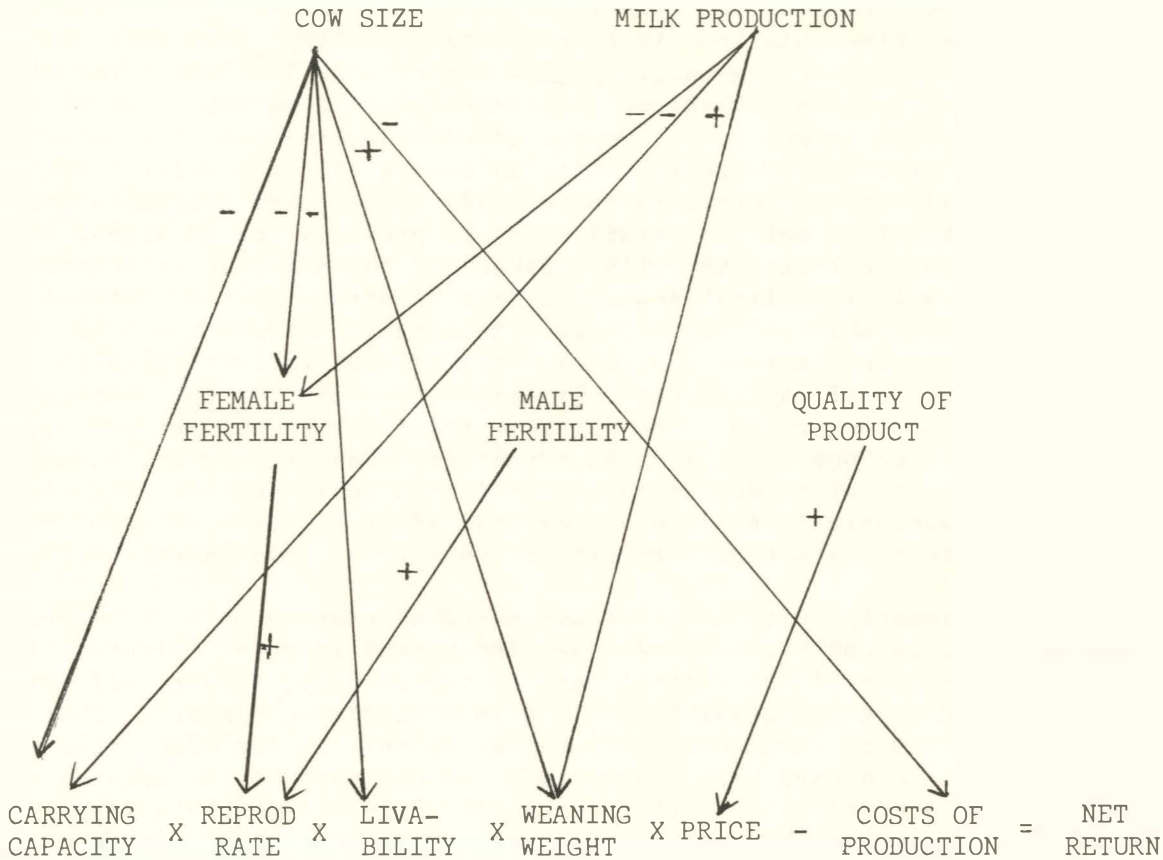

Figure 1. Equation for net return for beef production.

the correlated effects of reproductive rate, livability and weaning weight with both cow size and milk production.

Table 1. Example of Effect of Differences in Cow Size and Milk Production Ignoring Their Effects on Related Traits

Carrying capacity		Reproductive rate		Livability		Weaning weight		Price per pound		Gross return
No.		%		%		lb		$		$
100	X	90	X	96	X	425	X	.32	=	11,750
83	X	90	X	96	X	425	X	.32	=	9,753

Net return, $

Gross		Costs		Net return
11,750	-	30,000	=	-18,250
9,753	-	28,300	=	-18,547

Assuming a 5% reduction in reproductive rate, a 2% reduction in livability and a 95 pound increase in weaning weight associated with the increases in cow size and milk production, we find the difference in gross return between the two breeding groups is reduced to about $700 (table 2). In this case after subtracting costs, the net advantage of the larger, higher producing breeding group is about $1,000.

Table 2. Example of Effect of Differences in Cow Size and Milk Production Including Their Effects on Related Traits

Carrying capacity		Reproductive rate		Livability		Weaning weight		Price per pound		Gross return
No.		%		%		lb		$		$
100	X	90	X	96	X	425	X	.32	=	11,750
83	X	85	X	94	X	520	X	.32	=	11,035

Net return, $

Gross		Costs		Net return
11,750	-	30,000	=	-18,250
11,035	-	28,300	=	-17,265

These examples are provided only to demonstrate the use of the equation and the importance of considering all factors in the equation. They should not be used in making decisions for a given ranch. Carrying capacity, reproductive rate, livability and weaning weight will all vary from ranch to ranch depending upon quantity and quality of feeds available and management practices even with the same breeding groups. These considerations dictate the need to evaluate choice of breed and breeding system for each production and management situation. Computerized assistance in making these kinds of comparisons has been available for the past three years.

These considerations also cast doubt on general recommendations that are sometimes made. One example is "Use large sires on small cows." This will not be the most profitable for all producers; and, in fact, if small in this recommendation refers to cows below the price threshold of 6 to 10 cents per pound mentioned earlier, it may not be the most profitable for most producers. This will be especially true as long as variable costs continue at present or higher levels. There probably are operations with feed supplies limited to the point of requiring small cows. However, even these cases should be calculated individually since a reduction in carrying capacity allowing fewer larger cows might return more in terms of lower variable costs, lower probability of calving problems, higher calf performance and higher calf price per pound.

The decision-making programs available at the present time represent only the first steps in the area of computerized assistance in management decisions. Future programs should assist producers in matching breeding groups to quality and quantity of forage and supplemental feeds available, in maximizing the occurrence of heat and conception through the use of supplemental feeds, and in evaluating breeding systems on both pre- and postweaning performance. The postweaning evaluations involving growth, feed efficiency and carcass quality and composition must also be made in order that the total needs of the beef industry will be met. The industry has in the past experienced problems associated with the production of cattle suited to only one phase of the industry. The kind of system evaluation discussed here should avoid that pitfall in the future. This is not to say that consumer demand will not change cattle in the future; but, when such change is called for, the systems approach should keep the industry in balance as it changes to meet the new demand.

In addition to production programs indicated, programs aimed at making marketing decisions should also become available. The decision whether to keep or sell at weaning or at the end of the backgrounding phase will be programmed as will decisions whether to maintain ownership of cattle through the feedlot and whether to feed at home or in a commercial feedlot. If cattle are owned through the feedlot stage, the decision of direct, auction or stockyard marketing can also be programmed.

With the passage of time needed to develop these programs will come the improved remote terminal equipment suitable for widespread use that will allow a producer to quickly obtain answers to these questions at a nearby location.

Summary

Producers are encouraged to keep abreast of new research developments that enable improvement to be made in factors associated with net return. They are further encouraged to consider all factors and the interrelationships among them before adopting a specific management practice or breeding system. This should include considering the cost of implementing a new recommendation as well as considering its benefit. The examples provided should emphasize the need for this overall evaluation.

Producers are cautioned not to use maximum feed supplies obtained in optimum years in estimating the cow size and milk production their management unit will support. Such practices will obviously lead to overestimation of reproductive rate and perhaps weaning weight and, if the error is large enough or the year is sufficiently below maximum, substantial loss could be incurred. These comments and the examples presented here should not be interpreted as favoring any particular size, type or breed of cattle. Rather, the intent is to urge the development of beef cattle tailored to the production and management capabilities of each producing unit.

Breeders of seedstock cattle will likely find it desirable to direct their breeding program toward the improvement of traits their breed can best contribute to the optimum beef animal in their locality. This may mean the same breed may have different goals in different sections of the country. It appears the responsibility for providing the producer with raw materials for building his optimum crossbred cow will rest with the seedstock breeder. For example, the producer will need a choice among breeds with regard to early growth rate, size, milk production and other important production traits. Concern about selection schemes and their effects on these important traits should fall to the breeder; but, if he neglects this responsibility, the producer will need to give attention to them.

Currently there is a great deal of discussion regarding mature size and the effect selection for rapid early growth has in increasing mature size. As indicated, this should be of concern to seedstock breeders. The producer might obtain an optimum for his operation by crossing either a large breed with a small one or by crossing two breeds of optimum size. The important consideration is that he obtain the early growth potential and other important traits necessary to his operation, the feeder and packer. No one needs large mature size at the present time, unless it is characteristic of a breed that is the source of another trait or traits needed in the cross. In this case the other breed or breeds used in the cross will need to compensate in size in order to reach optimum in the crossbred herd.

Because mature size can be expected to increase as a result of selection for rapid early growth, long time selection may change a smaller breed into a larger breed. Analysis of mature size data from the Hereford herd at the Antelope Range and Livestock Station indicates a 5 pound per year increase in mature size associated with selection for early growth. While this is not exceptionally large, it does indicate the need to consider possible alternatives if a breeder has reached what he considers to be the upper limit of size for his herd. This increase is certainly less than that resulting from selection for mature size itself. Recent research efforts directed toward modification of the growth curve in the direction of increasing early growth with only limited increases in mature size have produced promising results. Further improvements in selection procedures may be expected from research in progress.