AN233

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Managing Beef Cow Efficiency[1]

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Introduction

Optimizing beef cow production efficiency can be complicated because many production variables can go into any equation that attempts to effectively represent breeding herd efficiency. Efficiency basically measure the inputs needed to create a desired output. In the case of a beef breeding herd, the output is generally regarded as the pounds of calf marketed, whereas the inputs are resources like feed and labor. Thus, the goal of producers should be to attain as many pounds of calf to market utilizing the least amount of resources possible. The two factors that contribute to beef cow efficiency are reproductive efficiency and feed efficiency. Beef herds that reproduce efficiently will have more pregnant cows, which will result in more calves and thus more pounds weaned. Feed is the largest variable expense in beef production, so cows that have greater feed efficiency will produce more pounds of saleable calf at less cost.

There are several factors that will affect both reproductive efficiency and feed efficiency in cows and most of these are related to nutritional demands, diet, and body condition.

The mature beef cow will prioritize dietary energy use as follows (Short et al., 1990):

1. Basal metabolism (feed for maintenance)
2. Physical activity (walking to water, grazing, etc.)
3. Growth (especially in younger cows)
4. Supporting energy reserves (body condition)
5. Maintenance of pregnancy
6. Milk production
7. Adding to energy reserves (measure by body condition score change)
8. Estrous cycle and initiating pregnancy
9. Storing excess energy

The dietary requirements of the cow are dependent upon maintenance needs, stages of pregnancy and lactation, and body condition score. Reproductive performance is directly related to meeting these nutritional needs or the cow may not cycle on time, resulting in cows that become pregnant

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later in the breeding season or cows that fail to become pregnant at all. In order to successfully manage beef cow efficiency it is important to consider several key points.

Cow Weight

Cow weight is a very important consideration when discussing beef cow efficiency. This is covered extensively in UF/IFAS' EDIS publication *Relationship of Cow Size to Nutrient Requirements and Production Management Issues* http://edis.ifas.ufl.edu/AN226 (Hersom, 2009). Briefly, as a cow's weight increases, the amount of feed she must consume for maintenance also increases. If she is unable to eat enough for maintenance, she will start losing weight, usually in the form of body condition. At this point feed supplementation is necessary or reproduction can suffer. Either scenario results in decreased profit. In a mature cow, each 100 pounds of additional body weight requires 500–550 lbs of additional dry matter (DM) intake per year. Table 1 illustrates daily DM intake requirements based on stage of production along with the estimated yearly DM intake totals compared to a 1200 pound cow.

Using these numbers and making some assumptions, annual feed cost differences may be estimated. Assume that: 1) hay is valued at $50 per ton at 88% DM; 2) supplement is valued at $150 per ton at 90% DM; and, 3) mineral supplements are valued at $680 per ton. In addition, assume that over the course of the year the as-fed diet will consist of 90% hay and 10% supplement and cows will ingest 4 ounces of mineral mix per day. This example demonstrates differences in the cost of feed among differing cow sizes.

Feed in the example would cost $60 per ton and contain 88% DM. This calculates to $68.03 per ton of DM or $0.034 per pound. Mineral adds $0.09 per day to the cost. The yearly feed costs for cows of differing weights is shown in Table 2.

As previously stated, feed costs are the largest variable cost in beef production. Table 2 illustrates that as cow size increases, feed costs do as well. In this example, the 1400 pound cow had 10% greater feed costs than the 1200 pound cow. While the $36 difference may seem inconsequential, it becomes more significant across 100 or 300 cows, and could be the difference in a cow returning a profit, breaking even, or losing money for the cattle enterprise.

In order to make up for the increase in feed costs, larger cows must return more income, either by being more reproductively efficient or by weaning heavier calves. In times of abundant feed, larger cows generally will return more pounds of calf at weaning. In times of limited feed supplies however, such as a drought, the larger cow can actually wean a smaller calf compared to her lighter-weight contemporaries. This was demonstrated in two herds at the University of Florida North Florida Research and Education Center in Marianna (Figure 1). Herd 1 had cows that weighed approximately 100 lbs less than herd 2, yet the weaning weights of herd 1 were greater than herd 2. In addition, the percentage of calf weaned compared to the weight of the calf˜s dam (weaning efficiency) was greater in herd 1 than herd 2. The net result was that calves from herd 1 realized a value of $510 at weaning compared to $450 for calves from herd 2.

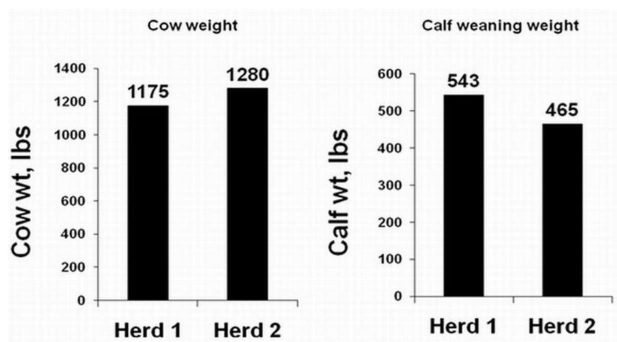

Figure 1. Cow body weights and calf weaning weights in two herds at the University of Florida North Florida Research and Education Center, in Marianna, Fl.

It is possible that the nutritional requirements of both cows and calves were not being met with the available forage, and reductions in milk production may have adversely affected calf performance, more so in the larger cows. These data demonstrate that larger cows do not always wean heavier calves, especially in times of limited nutritional resources. Based on earlier assumptions, the heavier cows at this location were certainly less efficient than their lighter-weight contemporaries.

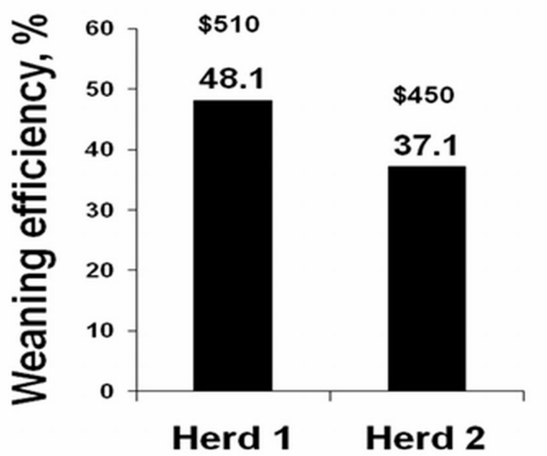

Figure 2. Weaning efficiency (percentage of calf weaned compared to weight of the dam at weaning) and value at weaning of calves weaned in two herds at the University of Florida North Florida research and Education Center, in Marianna, Fl

Milking Potential

Milk is an important consideration in evaluating the efficiency of the beef cow. Milk production is highly correlated to levels of feed intake. Table 3 reflects DM intake requirements for cows of different milking levels according to the NRC (2000).

Based on the data presented in Table 3, a high milk producing cow will need about 703 pounds more DM per year than the low producing cow. Many producers will select for greater milk when choosing herd sires and replacement heifers in order to maximize nursing calf gains. Early calf growth is affected by cow milk production (Clutter and Nielson, 1987), but Ansotegui et al. (1991) found that calf gain after day 60 of lactation was as much a function of calf forage intake as dam's milk production. If available feed isn˘t adequate to meet lactation requirements, the cow will begin to use body condition to meet her energy needs. The result can be sacrificing future reproductive activity and ultimately, stopping lactation, which can have an adverse effect calf performance. Consequently, producers that select for high milk production should have abundant feed resources available.

Using the data presented in Table 3, a feed cost example can be calculated. Using the same feed costs presented earlier (90% hay and 10% supplement) that was valued at $68.03/Ton of DM, the high milking cows feed would cost about $24 more per year than the lower milk producing cow.

Body Condition Score

Body condition score (BCS) may be the most underutilized tool in the beef producers toolbox (Kunkle et al., 1997). Assessing the herd average BCS relative to stage of production and feed availability gives producers useful information about how to nutritionally manage the beef breeding herd. Both reproductive efficiency and lactation are affected by the cow's body condition. Cows that are thin at calving can suffer due to the subsequent demands of lactation. This can lead to reduced milk production and will often extend time to rebreeding or can result in a failure to become pregnant. Conversely, a cow herd that has excessive BCS may have access to an abundance of feed and the producer may be able to better manage feed resources, reducing feed costs.

Table 4 presents the results of a study where spring-calving cows were assessed for BCS immediately prior to calving and the percent of those cows that cycled during the subsequent breeding season. The data is broken into early and late calving groups. These data simply illustrate the influence of body condition on post-calving reproductive performance.

From an efficiency of production standpoint, it might be best to change BCS in cows during the period immediately following weaning. This stage of production is when cows are at the lowest plane of nutritional need, and will more easily gain body condition and can do so using lower quality feedstuffs. Producers that target an average BCS of 5-6 at calving should assess BCS at weaning and then make the necessary adjustments to the diet at that time to bring cows to the desired BCS at least 2 months prior to calving. Trying to increase body condition in cows during late-pregnancy requires a diet higher in energy and will be more costly. According to the NRC (2000) in order for a 1200 pound, non-lactating cow in early- to mid-pregnancy to gain one body condition score in 60 days, that cow will have to consume daily 21.8 pounds DM, 12.6 pounds (58%) TDN and 1.38 pounds (6.3%) of CP

(DM basis). Conversely the same cow, to increase one BCS in 60 days during late pregnancy, will require 23.5 pounds DM, 13.9 pounds TDN (59%) and 1.74 pounds CP (7.4%; DM basis).

Conclusions

Optimizing long-term beef cow-herd production efficiency is important to profitability in any beef cattle operation. In Florida, where feed and forage availability can be variable, matching cow size and milk to the available feed resources is important to the profitability of the beef enterprise. Understanding the importance of BCS in relation to stage of production should result in more pregnant cows, return more pounds of calf at weaning, and lower feed costs. Increasing long-term beef cow-herd production efficiency will result in more profitable years and increase the value and sustainability of the beef cow herd.

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Table 1. Daily dry matter intakes (lbs) of beef cows of varying mature weights[1]

	Stage of Production					
	Lactation		Pregnancy		Yearly Total	Compared to 1200 lb cow
Cow Weight	Early	Late Early	Mid	Late		
1000	24.8	23.5	21.0	21.0	8249	-1095
1200	27.6	26.5	24.1	24.2	9344	0
1400	30.4	29.4	27.0	27.1	10403	1059
1600	33.1	32.2	29.9	30.0	11425	2081

[1] Adapted from NRC (2000) .

Table 2. Comparisons of yearly feed costs between cows of different weights[1]

Cow Weight (pounds)	Intake (DM)	Yearly Cost	Compared to 1200 lb cow
1000	8249	313.32	-37.22
1200	9344	350.54	0
1400	10403	386.55	36.01
1600	11425	421.30	70.76

[1] Assumes a feed that is 90% hay at $50/Ton, 10% supplement at $150/Ton, and 4 ounces of mineral/day at $680/Ton.

Table 3. Daily DM intake (lb/day) of cows across varying milk production levels1

	Stage of lactation		
Milk (pounds/ day)	Early	Late	Yearly difference from 20
10	26.5	26.5	-381
20	29.0	27.9	0
30	31.5	29.0	322

[1]Based on NRC (2000)

Table 4. Effect of body condition score on percent of cows cycling in the subsequent breeding season[1]

	Percent of Cows Cycling					
	Early Calving Cows			Late Calving Cows		
BCS in March (prior to calving)	May	June	July	May	June	July
< 4	10.0	28.2	70.5	0.0	0.0	44.7
5	17.8	43.5	85.6	0.0	26.0	74.4
6	41.9	77.5	97.5	0.0	35.3	98.5
> 7	45.9	76.6	94.7	0.0	65.8	99.1

1Adapted from Pruitt and Momont, 1988