Ridin' Herd

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How cow weight, milk output affect feed costs

Last month we discussed the effect of mature weight and milk production on dollars generated in a cow-calf enterprise. The females differed in mature weight, but had the same milk output. When accounting for a price slide and some discounts, cows with a mature weight of 1,200 pounds (lb.) generated the most revenue, followed by the 1,000-lb. mature females, then the 1,400-lb. mature females. Because feed costs are between 40% and 60% of annual cow costs, what are the forage feed cost differences between the herds that have cows of different mature weights but the same milk output?

Nutrient needs as weight varies

To re-set the parameters, let's assume all groups of cows are managed on a fixed resource base. On the same fixed resource base, if there were 100 head of 1,200-lb. cows, there would be 90 head of 1,400-lb. cows, or 112 head of 1,000-lb. mature cows.

Metabolic body weight is defined as body weight to the ¾ power (body weight^{¾}), which also describes the surface area and is representative of the active tissue mass or metabolic mass of an animal. So, as cow weight increases, maintenance feed needs also increase because metabolic body weight increases.

Annual maintenance energy needs for a 1,400-lb. cow with a milk output of 20 lb. per day is 9,249 megacalories (Mcal) per year. A 1,200-lb. cow with the same milk output has maintenance needs of 8,339 Mcal per year; and the 1,000-lb. cow requires 7,415 Mcal per year. Maintenance energy needs seem to make sense — as cow weight increases, so do maintenance energy needs, because as body mass increases there is more surface area and therefore increased nutrient needs.

The maintenance energy needs reported here take into account the fact that cows will have lower needs when they are not lactating and that cow nutrient needs increase as they progress from early gestation to late gestation, being greatest during lactation.

Annual maintenance energy needs for the cow in Mcal units may be a little difficult to understand because producers are not familiar with this way to express energy. If you were to divide annual maintenance needs by 365 days, you would arrive at the average daily Mcal needed.

Mature cow size and milk output affect nutrient needs, dollars generated and input costs, especially feed costs.

As an example, for the 1,200-lb. cow producing 20 lb. of milk daily, average daily maintenance energy would calculate to 22.8 Mcal per day. If the cows were eating a grass hay that was 9% crude protein and 57% total digestible nutrients (TDN), providing 0.95 Mcal per pound of hay, each cow would need to consume about 24 lb. daily on a dry-matter (DM) basis (22.8 Mcal ÷ 0.95 Mcal per pound). If the hay were 85% dry matter, she would need to eat 28 lb. daily on an "as-fed" basis to meet her maintenance requirement.

Similar calculations indicate that the 1,400-lb. mature cow would need, on the average, 25.3 Mcal per day; and the 1,000-lb. mature female would need, on the average, 20.3 Mcal per day.

Estimating annual cost

It is difficult to determine an annual forage feed cost, but if the calculations are calculated the same for each group of cows, which differ only in mature cow weight, the groups could be ranked in terms of forage feed costs. If we assume that the average quality of the forage consumed annually is the same as that described above, and a price for the forage is the same for all weight groups, then we can calculate a forage feed cost.

If the forage has about 0.95 Mcal per pound, and if it costs on average $70 per ton of forage dry matter, then the calculations can be made. The group of 1,200-lb. mature cows will consume 24 lb. of dry matter per day, or 4.4 tons of dry matter annually. That calculates to an annual forage cost of $308 per cow.

In contrast, a herd of cows with a 1,400-lb. mature weight would eat 26.7 lb. of dry matter daily, or 4.9 tons annually, and the forage cost calculates to $343 annually.

Using the same process, the herd of 1,000-lb. mature cows would eat 3.9 tons annually, and forage costs would be $273 annually.

It doesn't take rocket science to figure that on a per cow basis the forage costs are greater for the herd of 1,400-lb. mature cows compared to the herd of 1,000-lb. cows, or that the forage costs per cow for the herd of 1,200-lb. cows would be intermediate.

The cows are being managed on a fixed set of resources and there are more females in the herd when they weigh 1,000 lb. as compared to when they weigh 1,400 lb. In the first article, we determined if there were enough feed resources to have 100, 1,200-lb. females, there would be enough for 90, 1,400-lb. females and 112, 1,000-lb. females.

Forage feed costs for the 1,400-lb. cow herd is $30,870, for the 1,200-lb. cow herd is $30,800, and for the 1,000-lb. cow herd is $30,576 — not much difference in forage costs for the three different groups of cows.

From the previous article, we calculated the group of 1,200-lb. cows generated more dollars from the calf crop, followed by the herd of 1,000-lb. mature cows, followed by the 1,400-lb. group of cows. There are fewer dollars left to pay for the other costs with the herd of 1,400-lb. cows compared to the other two groups. When comparing the 1,200-lb. and 1,000-lb. groups it is about a wash with regard to the dollars left after forage feed costs to pay for all other cow costs, with a narrow edge favoring the herd of 1,200-lb. cows.

Final thoughts

It took three monthly articles to get to this point. Mature cow size and milk output affect nutrient needs, dollars generated and input costs, especially feed costs. What can a cow-calf producer do from a selection standpoint to keep costs, especially feed costs, manageable?

1. Avoid extremes in cow size (mature weight) and milk output. This will result in less growth and carcass weight, but appears to be the most cost-effective.
2. Cull nonpregnant cows as they may be telling you that they don't fit your resources or management style.

3. Adjust calving and/or weaning to manage body condition and to reduce feed costs.
4. Stayability in a commercial cow-calf operation is related to profit potential. Use cow maintenance expected progeny differences (EPDs) as part of the bull selection criteria when possible.
5. As we continue to get a better understanding of residual feed intake (RFI) and its relationship with cows that are foraging range/pasture, source seedstock producers that include RFI in a selection index. Still, the challenge remains: As genetic trends for many of the important traits continue to increase, producers may find it harder and harder to maintain the genetic package that fits their resources and environment, even when avoiding selecting for extremes. This has the potential to affect feed costs and profitability of the cow-calf enterprise.

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Editor's Note: *"Ridin' Herd" is a monthly column written by Rick Rasby, professor of animal science at the University of Nebraska. The column focuses on beef nutrition and its effects on performance and profitability.*