Ridin' Herd

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Precalving fat supplementation

Adequate energy is needed to achieve optimal reproductive performance in beef cows. Historically, energy for beef cows is supplied through the forage resource base, either grazed or harvested. If energy supplementation is needed during conditions when forage is lacking, high-energy supplements that have a base of corn, wheat midds, barley, or grain byproducts such as distillers' grains and corn gluten feed are often used. An alternative to add energy to the diet is feeding feeds that contain a high percentage of fat.

Supplementing fat precalving

Most feeds contain some fat, and some are greater than 10% fat. There are data that indicate potential for moderate levels of supplemental fat to elicit a favorable reproductive response compared to control supplements of equal energy. Several different fatty acid sources that may have direct actions on reproductive function have been studied. However, research tends to be inconsistent when a positive response on reproduction is elicited.

Feeding fat to beef cows is not new. Research at North Dakota State University more than 15 years ago indicated some possible benefits, especially for cows in poor body condition (BCS 4 or lower).

More recent work at Miles City, Mont., by Bob Bellows, indicated some variable results on reproductive performance, but did see a response in calf survivability for calves whose dams were fed fat prior to calving. When 2-year-old heifers were fed crushed safflower seeds — which are high in fat — before calving, pregnancy rate increased 18.5%. This research was initiated to evaluate the effect of fat supplementation on cold tolerance of newborn calves, which was why the fat supplement was only fed precalving.

> **"If supplements that contain fat are economical, use them in the diet."**
>
> **— Rick Rasby**

Fat did appear to improve the cold tolerance of the newborn calves, which is believed to be due to an increased level of "brown fat" in newborn calves. This brown fat is readily available as an energy source. In this study the crushed safflower seeds that were fed were high in linoleic acid, which may be important in the composition of deposited fat.

Although a tremendous gain was made in reproduction, a concern with this data is that the controls that were not fed supplemental fat had a 57% pregnancy rate. This is much lower than experienced in most cow herds, even with 2-year-old, first-calf cows.

A follow-up study at Miles City showed a response in pregnancy rate when soybeans, safflower and sunflower seeds were fed. In this study, the overall reproductive rate was much higher. The heifers that were supplemented with the fat sources had pregnancy rates of 90%-94%, while the controls were 79%.

An interesting finding in this study was that the weaning weights of calves whose dams were supplemented with fat were significantly heavier [17 pounds (lb.)] at weaning than calves from control cows. This was true even though fat supplementation was only provided before calving, raising the question, "What effect does fat have on the hormonal pattern in young cows, if any?"

In this study, an improvement in pregnancy rate and weaning weight was achieved, and yet no significant differences were found in cow weight, body condition changes or calf birth weight.

In another experiment, supplementing diets with sunflower seeds (6.5% fat in diet) the last 68 days before calving did not improve subsequent pregnancy rate compared to the control diet (2.2% fat). The major difference between the two studies was forage availability. When

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adequate nutrients are available, the effects of supplemental fat appear to be masked. In the first study, the crushed safflower seeds were high in linoleic acid, which may be important in the composition of deposited fat.

In a separate study, feeding whole soybeans (WSB) at a rate of 3.5 lb. per head per day before calving improved first-service pregnancy rates in a 45-day natural-service breeding period (WSB fed 45 days), as well as in a synchronized artificial insemination (AI) program (WSB fed 30 days). No advantage was seen when supplementation was initiated at calving or 30 days before breeding.

At the University of Nebraska, we designed a study to determine the effect of supplementing fat from whole corn germ before calving on reproductive performance of beef cows. Precalving supplements supplied a similar amount of energy. Whole corn germ is approximately 12.5% crude protein (CP), 140% total digestible nutrients (TDN) and 45% fat. Cows were supplemented with 2.5 lb. per head per day on a dry-matter (DM) basis of whole corn germ, and the control cows received 4 lb. per head per day on a DM basis of corn as the energy supplement. Calf birth weight, calf weaning weight, ovarian activity (an indicator of whether cows are cycling) before the start of the breeding season, pregnancy rates or calving interval was not influenced by supplementing fat from corn germ prior to calving.

Fat supplementation in forage diets

Fat is much higher in energy compared to grains. Research has shown that high levels of fat in the diet (in excess of 6%-8% of the ration DM) lower forage digestion. The hypothesis is that fat in high-fat rations coats the forage in the rumen, which makes the forage inaccessible to the microflora. In addition, high-fat rations may alter the rumen microflora populations.

This usually means that approximately 0.4 lb. to 0.6 lb. of supplemental fat could be fed in a high-roughage feeding program. Supplementing 2 lb. of a 20% fat supplement would be an example of a supplementation program strategy when considering that there will be some fat coming from other feed sources in the diet. When developing beef cow diets, I keep the level of fat in the diet so as not to exceed 5% fat in the total diet.

Final thoughts

So, to unravel the "fat" supplementation story for beef cows prepartum, it is unclear to me at this point if the source of fatty acids in the fat is important in regard to reproductive performance. Questions arise as to what effect fat and the fatty acids may have on the cows' metabolism and hormonal patterns. Fat is much higher in energy (TDN = 180%) than grains such as corn or barley; however, it appears that fat supplementation to cows is more than a direct energy response.

I think it is safe to say that supplementing fat precalving will increase the brown adipose tissue in newborn calves and help them tolerate cold stress.

Until research helps us define the specifics, it boils down to dollars and cents. If supplements that contain fat are economical, use them in the diet. For example, in early fall 2006, whole soybeans were a great buy, and feeding them to mature cows at 2.5 lb. to 3.5 lb. per head per day in some forage diets made for a very economical diet.

In some locations in the United States, distillers' grains are a good buy and are used as an ingredient in some pellets and cubes. Distillers' grains are about 12% fat and would be an excellent source of fat if priced to fit your program.

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.*