

How much fiber for close-ups? It depends

During the 60 days before calving, about two-thirds of the mass of the calf is being developed. This alone can account for about 1.5 pounds daily gain of the cow. And at calving, the cow immediately loses 11 percent of her body weight due to the calf and fluids and tissues associated with it.

The cow goes through major metabolic, physiological, and hormonal changes, especially just before calving. The difficulty in doing research in this area, and handling cows on farms as well, is that there are a multitude of factors that influence what can occur. Many of these are interrelated.

More energy needed . . .

As the cow nears calving, her diet must be altered to accommodate several changes. During the dry period, the diet typically has been higher in forage and lower in energy. But there is a need to adjust rations to higher energy for transition, similar to the type of diet needed after calving.

A German-Israeli study published in the mid 1980s looked at the effect of type of diet on ruminal papillae changes from eight to nine weeks before calving to eight weeks after calving. It appears that the energy-poor and energy-rich diets studied (no composition was shown) were at extremes of what we might typically find in practice. What they found is that ruminal papillae (length, width, and surface area) decreased when the energy-poor diet was fed initially. Then this situation was reversed when the energy-rich diet was fed. They concluded that this process, in either direction, required four to five weeks.

As the rumen papillae proliferated, they also were able to absorb the ruminal volatile fatty acids faster and thus minimize acidosis. As with rumen development in calves, the order of stimulation of papillae development from volatile fatty acids is butyric followed by propionic — both from fermentation of nonstructural carbohydrates such as starch, although the production of butyric is less well understood — and then acetic from fiber fermentation.

In calves, this process takes about two to three weeks. Thus, it is likely that, with more moderate dietary changes, two to three weeks is the time needed for transition cows, also.

Another change just before calving is the drop in dry matter intake (DMI). It can be 25 to 30 percent during the three weeks prior to calving.

If nutrient intake is to be at least maintained for the benefit of the cow and developing calf, then nutrient

concentrations need to be adjusted in view of lower intakes. The box shows nutrient levels of example diets in the 2001 Dairy NRC.

If the drop in intake before calving is not as great as indicated in

	What NRC 2001 says* (% of dry matter)		
	Dry cows	Close-ups Cows Heifers	
Crude protein	10-12.4	12-12.8	13-14
ADF (min.)	21	17-21	17-21
NDF (min.)	33	25-33	25-33
NFC (max.)	42	36-40	43

*Fiber levels represent a "minimum range", while NFC levels represent a "maximum range".

the NRC, and some recent California field data indicate it is not, then the use of higher starch or NFC levels to provide higher energy levels may not be as necessary.

Where opinions differ . . .

It is these energy levels along with the amount of nonstructural and structural carbohydrates that elicit differences of opinion and experience. Rather than get into arguments over "the" right number, let's exam what factors may most influence what the specific number might best be.

Body condition score (BCS). Studies have shown that cows with BCS in the high 3s or greater than 4.0 are most likely to have lower intakes before and after calving, more problems around calving, and lose the most condition after calving. This, in itself, is a problem showing up as high plasma NEFA (nonesterified fatty acid) levels. The optimal body condition score at calving appears to be between 3.25 and 3.5.

Type of diet and types of ingredients. Similar to rations for milking cows needed to maintain milk fat levels, rations for close-up cows should be formulated to minimize acidosis. This can mean avoiding ingredients and levels of feedstuffs that are highly fermentable, avoiding highly-processed and low particle-size rations, and not having excessive ration moisture levels . . . above 55 to 60 percent.

For instance, let's say you feed high-moisture grain or finely ground grain to your milking cows. These may be used at lower levels in the close-up ration to boost energy content but not to the extent that they would foster some acidotic conditions.

NDF levels can be quite variable depending on the digestibility and rate of fermentability of the NDF forage sources. High NDF fermentability of nonforage ingredients can be a benefit, especially when it minimizes higher starch rations. But do not allow this to lower NDF from forage.

Research has shown for milking cows with higher energy rations that nonforage ingredients can

even substitute for some of the forage. But with close-up rations, we are involved in a transition period where the bulkiness and slower type of fermentation from forage has a protective function.

Very high forage levels, near 80 percent, only seem to be workable if alfalfa is the main component. But then dietary cation-anion difference (DCAD) may become more critical. Alfalfa seems to be workable at this higher forage level because of its higher cell solubles content and lower NDF level compared to grasses. And corn silage at higher levels has just too much energy and fermentability without these protective features.

Also monitoring ADF levels for this factor can provide complementary information to NDF which in itself often can be more variable in analysis. Any time more than one factor is considered, it increases the likelihood of not been overly dependent or biased by one factor alone.

Fat level and source. I am not aware of any data to show a benefit to added fat in diets prior to calving. Yes, you can raise energy level this way without being more dependent on starch, but the cow is not in the same metabolic state to use dietary fat as after calving.

Heifers versus cows. First-calf heifers do not experience the same drop in intake right before calving. But they are not socially adapted to the competition they will get before and after calving. And they have a slower increase in intake after calving, not peaking for another month or two after older cows do.

Facilities and management. Cow comfort is the key to intake. Be sure:

- That cows are not too crowded for housing and feed bunk space
- That shade is available in the summer, and protection from adverse weather is provided as practically as possible
- That rations are not left to accumulate in the feed bunk
- That water is readily available, clean, and of good quality and
- That first-calf heifers are not being limited, if not separated

How often do you move cows and heifers into the close-up group? If it's only once a week, then the three-week period may only be about two weeks for some. Twice-a-week moving provides more flexibility and avoids this potential problem, but it does require some more time and commitment.

Feeding and care during the close-up period requires "The Eye of the Master" to formulate the best approach at that time. I say "at that time" for circumstances, feedstuffs, and so forth, can change over a few months requiring further adjustments.

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