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The importance of protein in dry cow diets

By Angie Manthey, Ph.D., Dairy Nutritionist, Hubbard Feeds

Significant advances in dry cow nutrition have been made in the last 20 years. Most recently, interest has shifted to the protein needs of transition cows. Advancements in the models for ration balancing have made it possible to estimate the metabolizable protein (MP) supply and needs of dry cows, while the use of crude protein still remains important. This gives nutritionists the opportunity to formulate diets for dry cows based on metabolizable protein and amino acids.

The majority of fetal growth (70 percent) occurs during the last 60 to 70 days of pregnancy. Dry matter intake during this time can vary significantly, typically dropping, especially in the last 21 days prior to calving. The cow starts mobilizing protein two weeks before calving, and this continues until about six weeks post-calving. This not only affects the energy status of the cow, but also the protein balance. By supplying the close-up dry cow with adequate metabolizable protein, without greatly exceeding the energy requirement, the cow can increase the nitrogen retention in her tissues, thereby decreasing the amount of protein mobilization before calving. This puts the cow at a better protein status at calving and helps to maintain that protein status just after calving when dry matter intake is low and the cow is susceptible to transition challenges.

The cow uses that mobilized protein for milk protein synthesis and, to a lesser extent, the production of glucose or energy. Protein and amino acids play a central role in many physiological functions, including immune system function and cell renewal. The transition cow is at greatest risk for infectious diseases during this time. Insufficient dietary protein supply can put stress on the system and result in the following issues post-calving:

- Retained placenta
- Metritis
- Poor colostrum quality
- Poor production and reproductive performance

To maximize colostrum quality, the dry cow diet should supply adequate metabolizable protein while also controlling energy.

What is the recommendation for adequate protein supply?

- One group dry cows, 110 to 120 percent of ME requirements
- 1,200 grams per day of MP

Far-off cows (dry off until three weeks pre-calving):

- 110 to 120 percent of ME requirements
- 1,000 grams per day of MP

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Hubbard Feeds
Mankato, MN
1.800.869.7219
www.hubbardfeeds.com

Close-up cows (last three weeks before calving):

- 110 to 120 percent of ME requirements
- 1,200 to 1,400 grams per day of MP

There is no benefit to feeding more than the recommended amount of protein. In a lactating cow, the rumen microbes will typically supply some metabolizable protein if there are adequate fermentable carbohydrates and nitrogen supplied in the diet. Since dry cow diets are low in energy and fermentable carbohydrates, especially starch, rumen undegradable protein (RUP) product typically needs to be included in the diet in order to achieve the appropriate amount of metabolizable protein and amino acid profile.

Sources

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Heather M. Dann. 2014. Transition Nutrition – Beginning the Discussion. The AABP Proceedings Vol. 47, pages 62-68.