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Strategies for Fresh-cow Management

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Profitability in the dairy industry is dependant on many factors, including the achievement of optimal milk production throughout lactation. Metabolic disorders or infectious diseases that begin during the transition period (three weeks before and after calving) can decrease profitability significantly due to lost production, increased treatment costs and increased culling.

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The emphasis on the transition period is based on the knowledge that peak milk production is related positively to production throughout the entire lactation. If the cow experiences stress or disease shortly after calving, not only is peak milk decreased, but production for the entire lactation can be affected negatively. Although metabolic disorders often have their origins prior to calving, early recognition of metabolic disorders in early lactation is vital for a successful lactation. The following information describes effective strategies for implementing a sound fresh-cow program to optimize cow health, milk production and subsequent reproduction.

The stress of calving, extreme nutrient demands for milk production and depressed dry-matter intake (DMI) are major metabolic and physiological characteristics that impact energy balance in early lactation. The fresh cow will experience multiple hormonal and metabolic changes associated with parturition and the onset of lactation that, when combined with depressed feed intake, lead to alterations in nutrient metabolism and body fat mobilization.

The main reason for the tissue mobilization of nutrients is that the mammary gland requires vast amounts of nutrients to produce colostrum and milk. The cow requires glucose, protein and fat for milk synthesis in addition to requirements for normal bodily functions.

Hormonal and metabolic adaptations associated with parturition and lactation can compromise the immune system and deplete fat stores. This leads to lower body weight due to increased nutrient demand beyond what can be obtained from feed intake alone. Therefore, special attention to management of the fresh cow and the early postpartum diet is necessary to avoid metabolic problems.

Nutrient demands for lactation will require a significant increase in consumption as well as dietary energy density, but avoiding abrupt changes in diet composition that increase the incidence of acidosis and displaced abomasum (DA) is important. For example, abruptly changing from a low-energy dry-cow ration to a high-concentrate lactating-cow ration may destabilize the rumen and lead to an off-feed event, thereby increasing the risk for metabolic disorders such as fatty liver and/or ketosis. Increasing DMI and rumen stabilization are interrelated and equally important in gearing the cow for a productive cycle.

Guidelines for Increasing Nutrient Intake and Stabilizing the Rumen

As dry-matter intake increases during the first three weeks after calving, recognizing the differences between younger and older cows is important. A healthy Holstein first-calf heifer can be expected to consume approximately 30 pounds of dry matter during week one post-calving, while a typical, healthy older cow will consume more, approximately 37 pounds of dry matter. These numbers represent healthy cows; therefore, if the fresh cow experiences

infectious or metabolic problems such as ketosis, metritis or mastitis, intake easily can drop 5 to 10 pounds per cow per day. If measured, intake can be a good indicator of pending metabolic problems.

Accurately predicting DMI of early fresh cows is crucial because DMI will determine the necessary nutrient density of the diet. Early fresh-cow rations should be formulated for dry-matter intakes ranging from 30 to 40 pounds.

Nutrient Considerations

When intake is reduced, concentrations of all nutrients need to be increased.

Dry-matter intake dictates the actual amount of nutrients (pounds of fat, pounds of fiber, grams of starch and calculated megacalories of net energy). Dairy cows require pounds, not percent, of nutrients. Three risk factors can occur with lower dry-matter intake.

- Low DMI leads to fat mobilization (cow attempts to provide energy from her body), leading to fatty liver development and ketosis, ending in impaired liver function.
- Low DMI leads to poor immune function, ending in a higher mastitis and metritis risks.
- Low DMI leads to an empty rumen (less fill), ending in displaced abomasum.

Close-up dry cows consuming more dry matter one day prior to calving had higher dry-matter intake 21 days after calving, reported by Wisconsin researchers. Any management or ration factor that will increase DMI at calving is a positive for transition cows. Other points, often somewhat controversial, can be related to DMI.

- Adding starch can increase rumen microbial digestion and rate of feed passage, providing more nutrients for the cow.
- Including 2 to 4 pounds of wheat straw can maintain rumen fill and pH, avoid empty rumen syndrome leading to DA and maintain fiber-digesting bacteria.
- Placing far-off dry cows on a restricted or lower-energy ration can avoid heavy cows (leading to lower DMI).
- Feeding higher levels of corn silage (more than 10 pounds of dry matter) in the close-up ration may increase dry-matter intake, raise forage quality, reduce diet potassium levels, improve ration palatability and stability, and increase fermentable starch in the rumen.
- Maintaining the same ration prior to calving and constant DMI, close-up cows may transition more smoothly.
- By using a series of rations (far-off dry cow, close-up dry cow and fresh cow), cows meet increasing nutrient intake and do not go off feed because changes are small, allowing cows to step up nutrient concentration.
- If adding an anionic product reduces DMI, expect problems related to energy intake. If anionic salts improve blood calcium levels, DMI can increase (smooth muscle contraction) and metabolic disorders can be minimized.

Energy balance is critical for optimal cow health, limiting weight change and future milk production. Illinois workers illustrate that current energy needs for close-up dry cows may be low. Dry-matter intake can be dropping 10 percent to 30 percent as cows approach calving. The unborn calf is growing rapidly and requiring more energy as calving approaches.

Another concern is the higher rates of twinning in U.S. dairy cows that would inflate this number even more. Mammary gland development (commonly referred to as bagging up) and colostrum synthesis add to energy needs.

If the environmental factors (such as heat stress and cold weather) are not in the cow's thermal neutral range, energy maintenance needs also can increase 10 percent to 20 percent. Close-up dry cows and heifers may experience greater energy shortages during the close-up dry-cow phase. Furthermore, close-up heifers cannot reach energy needs unless higher dry-matter intakes are achieved.

Protein status or requirements may parallel energy dynamics. Cornell workers established protein guidelines for the unborn calf that rapidly increase the amount of amino acids needed as calving approaches. The Dairy National Research Council (2001) recommends 12 percent crude protein for far and close-up mature dry cows and 14 percent to 15 percent crude protein for close-up pregnant heifers (extra protein needed for mammary gland development, growth and colostrum synthesis).

The Dairy NRC committee calculated mammary gland growth is about 130 grams of crude protein, or an increase of 1.3 percentage units, above baseline crude protein needs. One major concern is if dry-matter intake drops significantly, the total amount of amino acids may be limiting.

Higher levels of crude protein and undegradable protein before calving have resulted in variable results. In some studies, reproductive performance and higher levels of milk protein were reported. Milk yield has not been improved with higher protein intakes.

Supplementation of first-limiting amino acids may be beneficial when fed before and after calving. Feeding excess crude protein could be a problem because the liver may not be able to detoxify excess ammonia related to fatty liver development. The following guidelines have been suggested by University of Illinois researchers for close-up dry cows.

- Mature cows need a ration containing 12 percent crude protein.
- Pregnant heifers need a ration containing 14.3 percent to 15 percent crude protein.
- If dry-matter intake is reduced below anticipated levels, a higher level of protein may be needed.
- When increasing crude protein levels in the close-up dry-cow ration, the source of undegraded protein and its amino acid profile should be considered.

- Protected amino acids maybe beneficial in close-up rations based on amino acid model predictions and accurate feed analysis.
- Stimulating microbial growth should improve amino acid supply to the close-up dry cow.

Roughage is important to rumen health. Suggested acid detergent fiber (ADF) levels during this early fresh period are no less than 21 percent, and the neutral detergent fiber (NDF) level is at about 30 percent. Nonfiber carbohydrate (NFC) should remain at 35 percent.

The following table lists the recommended concentration of minerals when formulating the fresh-cow ration. Remember that the goal is to increase mineral concentration to compensate for the reduced DMI.

Recommendations for mineral levels in the fresh cow ration.

Mineral	% DM
Calcium	1.10
Phosphorus	0.50
Magnesium	0.33
Potassium	1.00
Sodium	0.33
Chlorine	0.33
Sulfur	0.25

NRC. 2001. Nutrient Requirements of Dairy Cattle. National Acad. Sci. Press, Washington, D.C.

For purposes of buffering the rumen during the ration "step-up" period, 0.8 percent of dry-matter intake as sodium bicarbonate often is included. Additives such as calcium propionate and propylene glycol may stimulate ruminal propionate production to improve energy status, whereas niacin and rumen-protected choline may stimulate liver fat metabolism. Yeast culture may stimulate DMI and enhance the ruminal environment for fiber-digesting bacteria. Probiotics usually are not recommended for fresh-cow rations. Selection of additives for fresh-cow diets should be supported by independent research and be an appropriate selection for the challenges represented on the specific farm.

Which Ration and Why Separate Pens?

Ideally, a specific fresh-cow ration is best for cows. This ration utilizes a moderate nutrient step-up while carrying the essential vitamins and mineral in a more concentrated package. The high-group ration offers high energy but likely is going to create more instances of DA and acidotic cows. The low-group ration makes a better step-up because it replaces some grain with forages, but this ration doesn't carry the more heavily concentrated vitamins and minerals to compensate for the reduced DMI.

The ration considerations also need to account for the average age of the herd. For a typical herd, the fresh-cow pen would contain two-thirds cows and one-third heifers. Recognizing that first-calf heifers will not compete well with older cows at the bunk, and plenty of space needs to be offered, is important. A good guideline is to keep the pen stocked to 85 percent capacity to avoid problems with heifers being blocked from the bunk.

Alternatively, feeding fresh cows a ration similar to another group may be more effective, considering the feedstuffs available and the time involved in mixing and feeding a ration dedicated specifically to feeding fresh cows.

Implementing a Proactive Method for Monitoring Fresh Cows

The real challenge for a sound fresh-cow program is finding the time, workers, experience and know-how to conduct examinations and monitor the fresh-cow pen routinely. However, this challenge is where the greatest level of opportunity exists to improve every cow's lactation. The easiest way to maintain the program is to formulate a detailed examination protocol, document daily results and apply necessary protocols for treatment. The following offers the fundamental checks and balances for prompt determination of the health for the fresh cow.

A dairy producer's main evidence for sensing fresh-cow disorders will come from monitoring milk yields. Edwards and Tozer (2004) found that cows experiencing ketosis, DA and general digestive disorders had milk yield reduced by 30 pounds per day. By monitoring milk yield, these problems could have been diagnosed five to six days sooner than through clinical diagnosis.

Reduced walking activity also was shown to be a clear indicator of early problems. However, this would require dairies to utilize pedometers to assess the reduction accurately. Close examination of milk production, coupled with routine observation of fresh-cow behavior and attitude, is a sound approach for early recognition of metabolic disorders.

The first step in monitoring cow well-being is simply conducting a visual evaluation. If the cow seems lethargic or is withdrawn from the herd, these are signs that she needs attention. The next step would include monitoring rectal temperature. This is often a routine practice for herd managers, especially when housed in an area of the barn dedicated for intensive care. Generally, measure body temperature once or twice daily. If her temperature is below 101 F or above 103 F, the producer needs to intervene.

While infections obviously require a health-related intervention for the cow, identifying the metabolic status of the cow is just as important. This process typically starts with a body condition score. However, this objective evaluation process, needs to begin long before calving so that cows nearing calving have adequate condition preparing them physically to support the forthcoming lactation and readying them for breeding.

Metabolic health often requires an examination of the rumen for function. Often conducted by the

herd veterinarian or a skilled manager, ruminal function can be determined by using a stethoscope. The caretaker is listening for one to two contractions per minute, a reasonable indicator of adequate ruminal function.

Other observations include examining for external indications of an unhappy cow. For example, look at her stance to see if her elbows are pointed out, her spine is arched or she is grinding her teeth. All these signs would indicate the cow is experiencing discomfort, likely abdominal pain, which affects her willingness to eat and, therefore, her ability to perform and remain healthy.

Another major metabolic stressor is ketosis. Ketosis testing by utilizing a milk or urine ketone analysis is necessary in determining when a cow is ready to leave the fresh pen. Another way to test for this condition, especially in severe cases, is to smell the cow's breath. Experienced veterinarians and herdsman often can recognize the scent of ketones, a distinctive smell resembling acetoacetic acid, which is similar to the odor of very ripe apples.

As your fresh-cow program develops, the experience with these simple checks will lead to better assessments of the cow. As these examinations are being performed along with routine observations of eating behavior, the herdsman can begin to make well-informed, individual-cow decisions.

A few more procedures can be implemented to monitor the fresh cow's health, which would include using a stethoscope to listen to the lungs and for a rapid heart rate, evaluating the consistency of the manure, and watching for nasal and vulval discharge. Vulval discharge may indicate a retained placenta and/or metritis. The closer you can pinpoint the overall health of the animal, the quicker you can diagnose, treat and transition cows through the fresh-cow program and into a healthy lactation.

Health problems during the freshening period can have a huge impact on milk production, reproduction and longevity of the cow. The procedures listed above will enable the producer to identify the five major health problems associated with fresh cows: left DA, retained placenta, metritis, ketosis and acidosis. Reliable monitoring of the cow means a quicker response by both personnel and the cow's immune system.

Ideally, recognition of potential fresh-cow health problems will begin in the late dry period because the origin of these disorders is often the nutrition and management of the dry cow. Nutrition, environment and vaccinations are crucial to the dry-cow program and ultimately affect the incidence of problems during the fresh-cow period.

Graduating from the Fresh-cow Pen

Many herdsman target a certain length of days every fresh cow needs prior to being moved to high-lactation groups. This philosophy may not be the ideal management scheme because some strong, healthy cows can move after four to five days, while other cows need four weeks to recover.

The individual cow graduation time approach makes more sense for meeting every cow's needs and being moved when *she* is ready. However, remember that if you have cows remaining in the fresh-cow pen for long periods, these cows are not moving to the high-lactation, nutrient-dense diet and their production will be limited.

Take-home Message

Fresh-cow management is a way to improve the well-being of all cows. Separating these cows from the other groups is a "must," and, ideally, separation of cows and heifers is recommended. Targeting a specific ration for fresh cows also improves the efficiency of initiating these cows to a healthy lactation. Monitoring and recording daily observations and measurements offers the best approach to detecting problems and determining the appropriate treatment.

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