Assessing Transition Cow Management and Performance

Michael W. Overton* and Paul Rapnicki†
*Elanco Knowledge Solutions-Dairy
, †Elanco Animal Health
Greenfield, IN 46140
*moverton@elanco.com

Introduction

In order to achieve high reproductive efficiency and high milk production, herds must properly manage the entire non-lactating period and early lactation. We refer to this time period as The Vital 90™ Days and it begins approximately 60 days before calving and continues through the first 30 days of lactation. During this time, dairy cows are exposed to a series of biological and physiological transitions that are usually accompanied by large changes in feed intake, dramatic shifts in hormonal profiles, and major fluxes in hepatic demands and function. The resulting negative energy and negative protein balance as well as immune suppression often leads to a multitude of metabolic and infectious problems.

In early lactation, dairy cows repartition nutrients toward the mammary gland and alter glucose metabolism via an attenuation of the somatotropic axis resulting in mobilization of body stores of fat and protein, a period of insulin resistance, and weight loss (Lucy et al., 1999, 2009). Essentially all periparturient dairy cows are exposed to these changes to varying degrees in addition to the reduction in feed intake and varying degrees of hypocalcemia, oxidative stress, and reduced immune function. As a consequence of the combined impact of these issues, 30 to 50% of cows are typically affected by some sort of metabolic or infectious disease process around the time of calving (Santos et al., 2013).

Cows failing to cope with these biological transitions are less likely to become pregnant in a timely manner and a variety of reasons explain this poor performance. Negative energy balance (NEB), and its various measures including cumulative NEB, duration and/or depth of NEB, and days to NEB nadir, likely has the largest impact on transition-related reproductive challenges in the dairy cow via the impact on return to ovarian cyclicity. Nonetheless, additional issues impact reproductive performance that can be attributed to or influenced by energy balance problems.

Cows developing uterine disease (metritis, clinical endometritis, and subclinical endometritis) often were exposed previously to a greater degree of NEB during both the preparturient and immediate postparturient period. Acute puerperal metritis is associated with prolonged days to first service, a reduction in first service conception risk, and prolonged calving-to-conception intervals (Fourichon et al., 2000). Both clinical and subclinical endometritis is associated with a reduction in conception risk and extended intervals to pregnancy (LeBlanc et al., 2002; Kasimanickam et al., 2004; Gilbert et al., 2005). There are also direct negative impacts of inflammatory mediators and intrauterine infection on ovarian function and embryonic survival.

Successful monitoring programs are critical to achieving optimal performance. Monitoring consists of the regular observation and recording of activities, events, and yields that occur with the intent of observing and evaluating the degree of change, intended or unintended, positive or negative, within the dairy system. The goal is to identify significant change in the system as early as possible in order to correct problems before experiencing even larger losses or to recognize positive responses to management changes. A good monitoring approach should include a systematic method to data collection,
evaluation, and provision of feedback about the changes detected.

Metrics evaluated within a monitoring program can typically be classified as either leading or lagging indicators. A lagging indicator is one that follows the event of interest, whereas a leading indicator predicts future events and usually changes ahead of the event in question. For example, postpartum disease events are lagging indicators of poor nutritional, housing, metabolic, and/or general management of cows during The Vital 90 Days. Stocking density of the far-off dry and close-up pens as well as the total amount of energy consumed during the far-off dry period could be viewed as leading indicators. Most monitoring programs have focused traditionally on the evaluation of postpartum disease outcomes (lagging indicators), but more emphasis should be placed on monitoring of leading indicators throughout The Vital 90 Days to prevent disease rather than simply waiting to respond to increased disease incidence.

Metrics utilized during The Vital 90 Days also should be evaluated, keeping in mind the concepts of individual cow metrics and herd-based metrics. When evaluating an individual cow for disease risk or potential need for culling, her age, production history, parity, prior disease history, and current body condition score are all potentially important traits for consideration. From a monitoring perspective, however, the focus is typically on herd-level leading and lagging indicators such as percent age of cows with excessive body condition, distribution of days dry, or the proportion of mature cows with clinical hypocalcemia.

Preparturient Management and Monitoring: Far-off dry Cows

The far-off dry cows (cows that are between dry off and the move into the close-up pen) traditionally have been a neglected group with little attention paid to feeding and housing management. Increasing evidence exists, however, that many of the periparturient problems often start during this period. Overfeeding throughout the dry period, specifically, excess energy during the far-off dry period, leads to a larger amount of liver fat after calving and increases susceptibility of cows to ketosis after calving (Dann et al., 2005, 2006; Douglas et al., 2006). Cows respond metabolically to excessive energy and overfeeding in a similar manner to cows that have increased body condition score: (1) they are more prone to developing insulin resistance; (2) more likely to experience larger declines in feed intake immediately before calving, and (3) are much more prone to hyperketonemia (subclinical or clinical ketosis) and excessive postpartum weight loss. Risk of postpartum hyperketonemia is even greater for cows that have longer than normal dry periods (Rollin et al., 2010). It seems that a combination of body condition, energy density of dry cow rations, and duration of exposure to energy dense rations impact the risk for hyperketonemia.

Key Monitors for the Far-Dry Group

Total Days Dry. Examine not only the average but perhaps, more importantly, the distribution. In general, with weekly pregnancy evaluations in AI herds and weekly moves to the dry pen, a herd should be able to have about 85-90% of the dry periods within +/- 14 days of their stated goal. In natural service herds, herds that move cows less often, or herds that struggle reproductively and end up keeping cows in milk longer in an attempt to achieve an adequate number of pregnancies, the variation will be significantly greater.

Nutrient Specifications. Energy and protein targets during the far-off dry period are estimated to be approximately 0.60 Mcal NE\(_f\) per lb of feed dry matter (15 to 17 Mcals of total NE\(_f\) per cow per day) and about 12 to 14% CP (1,000 grams of metabolizable protein per day), respectively, with a starch level up to 18% and at least 36% NDF (Lean et al., 2013). In addition, target at least 4 inches of linear water trough access per cow per group (Smith et al., 2006).

Dry Matter Intake (DMI). In mixed parity groups, DMI will vary based upon the distribution by parity. Most far-off dry groups, however, do not include heifers. In mature cow
groups, DMI should typically range from 26 to 32 lb, depending on body size and environmental conditions, based on clinical observations by the first author.

**Housing and Comfort.** Typical space requirements vary with the type of housing system, but in general include approximately 100 sq ft per cow in bedded packs, approximately 500 to 600 sq ft per cow of loafing area, and 50-75 sq ft shade area per cow in open corrals, or a minimum of 1 properly bedded and maintained freestall per cow when using freestall housing (Graves, 2006, Smith et al., 2006).

**Preparturient Management and Monitoring: Close-up Dry Cows**

Strong relationships exist between preparturient feed intake and periparturient immune status, postparturient feed intake, milk production, risk of ketosis and other diseases, and onset of postpartum ovarian cyclicity. These relationships, however, are limited not only to the level of feed intake, but more importantly, to the magnitude of its decrease just before calving. Level of feed intake during the prepartum period has been shown to decrease by 30 to 35% during the last 7 to 14 days before calving (Bertics et al., 1992; Grummer, 1993; Vandehaar et al., 1999). The decrease is more severe in multiparous cows, especially fat cows (body condition score of 4 or greater on a 5-point scale; Hayırılı et al., 2002). Cows exposed to a large decrease in intake during the final 2 weeks before calving mobilize more fat and are at a greater risk for insulin resistance issues, ketosis, metritis, and displaced abomasum after calving. The most important factor for the level of liver triglycerides on day 1 postcalving has been shown to be the amount of energy intake change during the last 28 days before calving (Rabelo et al., 2003). Essentially all lactating cows must mobilize some fat during early lactation to meet their energy needs. Lactating dairy cows normally will lose up to 0.75 units of body condition during the first 30 to 60 days. Cows that lose a full body condition score or more during early lactation are twice as likely to experience subclinical ketosis and are 1.4 times more likely to be open after first service (Domecq et al., 1997' Duffield et al., 1998).

Feed intake, during both the pre- and postparturient periods, can have dramatic impacts on antioxidant status, energy balance and transition cow performance aside from the direct effects on ketosis. Published work illustrates the link between preparturient feed intake, immune function, and postparturient disorders such as retained placenta (Goff and Horst, 1997, 1998; Kimura et al., 1999; Kimura et al., 2002; Goff, 2003, 2006). Researchers in the Netherlands have proposed that placental tissue becomes a “foreign body” following parturition and the body must recognize and reject it in order to have successful expulsion of fetal membranes (Gunnink, 1984a,b). Peripheral blood leukocytes display greatly reduced chemoattraction to cotyledonary tissue in cows with retained fetal membranes. This reduction in chemoattraction is evident several days before calving for cows that subsequently develop retained fetal membranes. Neutrophil function, as determined by myeloperoxidase activity and cytochrome c reduction activity, also has been shown to be impaired in cows with peripartum NEB and decreased DMI (Hammon et al., 2006). In this same study, cows exhibiting decreased neutrophil function during the prepartum period were more likely to develop acute puerperal metritis or subclinical endometritis in the subsequent lactation. Similar findings also have been reported for mastitis. Consequently, there seems to be a link between prepartum intake, impaired immune function and an increased risk of postparturient diseases.

Nutrient requirements during the close-up dry period are similar to that of the far off group with the possible exception of changes in mineral levels resulting from use of the DCAD approach for managing hypocalcemia. In fact, many nutritionists now feed very similar diets to close-up and far-off dry cows with a few specific exceptions. Vitamin E has been shown to improve immune function and decrease the risk of retained placenta, metritis, and mastitis in fresh cows. Specific levels of Vitamin E to
Key differences \textcolor{red}{(Lean et al., 2013)}. In addition to the vitamin and mineral (approximately 0.62–0.66 Mcal per lb DM NEL) and a slightly higher energy density (20%), and a slightly higher energy density in the day, slightly greater levels of starch (16 to 20%), and a slightly greater energy density (approximately 0.62–0.66 Mcal per lb DM NEL) in addition to the vitamin and mineral differences \textcolor{red}{(Lean et al., 2013)}.

**Key Monitors for the Close-up Group**

**Days in Close-up Pen.** Cows are typically moved to the close-up pen at approximately 21 days before expected calving date. Ideally, cows should spend at least 14 days in the close-up pen. Clinical experience as well as some non-published work by the first author suggests that cows spending less than 10 days in the close-up pen are exposed to more metabolic challenges after calving and have decreased reproductive performance. Because of the inevitable variation of calving dates, in order for most herds to have at least 90% of cows spend at least 10 days in close-up pen, the average days in close-up pen probably should be 23 to 24 days. If possible, target slightly more days in the close-up pen for cows known to be carrying twins or cows that are dry during summer heat stress conditions because they are expected to have shorter gestation periods and will usually calve 5 to 7 days early. The goal is to have > 90% of cows spend at least 10 days in close-up pen.

**Monitor Feed Intake.** Dry matter intake is one of the simplest and earliest indicators of change and future potential problems in close-up cows but yet is often overlooked or not recorded. In general, weigh feed delivered and feed refused on a daily basis and target for a 5% level of refusals for the close-up cows. Based on a typical 21 to 24 average days in the close up pen, targets for DMI are approximately 26 lb or more for mature Holsteins and greater than 23 lb for Holstein heifers.

Ensure that the ration is not easily sortable by grinding hay and straw to 2 to 3 inches in length and adding water if necessary to achieve a dry matter content of 50 to 55% for the ration. Check the ration for sorting by running a couple of subsamples from the newly mixed close-up diet through a Penn State particle separator. Repeat on a couple of subsamples from the day-old close-up diet and compare the results. Generally, the higher the level of refusals, the smaller the difference between fresh and refusals in terms of particle distribution. The goal is to have the fresh results as similar in distribution across the particle separator as possible to the refusals.

**Stocking Density.** Any number of stressors, including inadequate amount of bunk space, inadequate resting area, heat stress, mixed parity groups, etc., can negatively impact feed intake. A reasonable goal is to provide a minimum of 30 inches of bunk space per cow.

**Housing and Comfort.** The close-up period, specifically just before calving, is another high risk time for acquiring new intramammary infections. As with other animals, mud and heat stress increase metabolic needs but decrease feed intake. Consequently, adequate space for resting that is clean and dry is required. As with far-off dry cows, typical space requirements vary with the type of housing system, but general guidelines are approximately 150 sq ft per cow in bedded packs, 500 to 600 sq ft per cow of loafing area in addition to 50 to 75 sq ft shade area cow in open corrals, or at least one properly bedded and maintained freestall per cow if using freestall housing \textcolor{red}{(Graves, 2006; Smith et al., 2006)}.

**DCAD Diets.** Monitor urine pH’s once weekly from 10 to 15 cows while feeding a DCAD diet. The goal is to have all cows with a urine pH between 6.0 to 6.9 following a minimum of 48 to 72 hours on the diet. Many people monitor the average pH but the average can be very misleading. For example, a group could have an average pH of 6.4, but have 4 or 5 cows that are between 5.2 and 5.8 while the remainder of the cows range from 6.8 to 7.5. These situations may arise from sorting of the ration or they may result from overacidification of the diet. In the latter case, overacidification (urine pH < 5.8) leads to an
uncompensated metabolic acidosis. As a result, cows that eat well register as a low pH, but because of the uncompensated acidosis, go off feed resulting in an elevated urine pH the next day. In general, overacidification results in depressed feed intake and perhaps compromised immune function, whereas inadequate acidification (urine pH > 7.2) can lead to severe, non-responsive downer animals following calving. Either scenario also can increase incidence of retained placenta.

**Postparturient Management and Monitoring: Fresh Cows**

Fresh cow monitoring and treatment programs are used to help mitigate the negative impact of common periparturient diseases such as dystocia, hypocalcemia, ketosis, metritis, and displaced abomasum. Unfortunately, by the time these programs are applied, much of the negative impact has already started and the dairy is essentially in damage control by then. Hence, efforts applied during the preparturient period to minimize the risk of these problems developing is critical towards meeting the goals of calving without assistance and without mastitis, freedom from issues of metabolic disease, high early lactation milk production and feed intake, reduction in both the severity and duration of NEB, and an early return to ovarian cyclicity that leads to timely and efficient reproductive success. Consequently, fresh cow monitoring and treatment programs are usually an important consideration for mitigating the impact of fresh cow metabolic and infectious disease challenges.

**Key Monitors for the Fresh Cows**

**Feed Intake.** Postpartum energy balance is more closely related to energy intake than energy output (i.e., milk yield) and a return to positive energy balance occurs more quickly for cows that consume large amounts of properly balanced diets (Grummer et al., 2010). Aim to weigh feed delivered and feed refused on a daily basis and target for a 5% level of refusals for this important group of cows. Most herds target approximately 21 days in the fresh pen but actual days may be longer or shorter based upon calving pressure and fresh cow feeding philosophy.

**Stocking Density.** As with any other group of cows, a wide variety of stressors, including inadequate amount of bunk space, inadequate resting area, heat stress, mixed parity groups, etc., can negatively impact feed intake. Fresh cows must deal with the social issues of regrouping, the pain that accompanies parturition, metabolic challenges, and often pyrexia. As a consequence, these cows are usually less competitive at the feed bunk and should be provided with more space in an attempt to encourage more feed intake. As a consequence, a reasonable goal is to provide a minimum of 30 inches of bunk space per head.

Because of seasonal changes and normal variation in calving patterns, herds should plan to provide bunk space above and beyond the average number of cows present at a given time in the close-up and fresh pens. For example, based on an evaluation of both southeastern and western herds, if the close up pen was sized for 125% of the average pen size, the pens would exceed the desired 85% stocking density about one third of the time. If the pen was sized based on 150% of the average pen size, density would exceed 85% about 15% of the time, but would result in less than 24 inches of bunk space per cow less than 2 to 3% of the time.

**Clinical Disease and Health Monitoring**

Although we have described postpartum disease monitoring as a lagging indicator, the level of transition diseases occurring is an important scorecard to examine when evaluating The Vital 90 Days. It is critical that a herd have a consistent system for keeping score and to know if progress is being made in their herd. Based upon experience, tremendous variation exists in the dairy industry in the types and accuracy of records maintained on-farm. Many herds struggle to capture key outcome data including specific disease outcomes and fewer yet record and evaluate key leading indicators. One increasingly popular approach that is aiding the recording of disease outcomes is the use of consistent
treatment protocols. Most if not all of the major computerized on-farm record systems facilitate and encourage the use of standardized treatment protocols. The linking of a proposed treatment approach with a specific disease outcome within the record system serves to encourage improved record keeping as well as standardizing the treatment approach used within farm. However, to create valuable records, a consistent well-defined definition for each disease is needed. Below is a set of standardized disease definitions that would fit most dairy needs (Rapnicki and Overton, 2014).

(1) **Milk Fever.** Clinical milk fever is identified when a multiparous cow displays clinical signs that include muscle weakness, nervousness, muscle shaking, cold ears, and eventually the cow is unable to rise. This condition is caused by low blood calcium concentrations and usually occurs within 3 days of calving.

(2) **Retained Placenta.** Retained placenta is recognized when the fetal membranes (placenta) are still visible hanging from the cow’s vulva 24 hours or more after calving.

(3) **Ketosis.** Ketosis is recognized when cows are identified with elevated ketone bodies in the blood (>1,200 µmol/L), milk (>100 µmol/L), or urine in the absence of concurrent disease. The risk period for transition-related ketosis is usually the first 30 days in milk, but testing is most commonly performed during weeks 1 and 2 after calving when the risk is greatest. Clinical ketosis is a more severe form of ketosis where the cow shows clinical signs of decreased appetite, decreased milk production, or abnormal behavior in the absence of another concurrent disease.

(4) **Metritis.** Clinical metritis is recognized by an abnormal (smelly and watery) uterine discharge within 21 days of calving. Upon palpation per rectum, the uterus appears flaccid, not contracting normally, and fluid filled. Mild clinical metritis is metritis without a fever or other clinical signs apart from the uterine changes. Severe clinical metritis is metritis with the presence of clinical signs that may include fever, depression, and lack of strong appetite.

(5) **Clinical Mastitis.** Clinical mastitis is recognized by visually observing abnormal milk from a quarter. Clinical mastitis is classified as mild, moderate, or severe based on whether the cow shows any additional clinical signs beyond abnormal milk.

- Severity score of 1 or mild mastitis: abnormal milk only.
- Severity score of 2 or moderate mastitis: abnormal milk plus inflammation of udder (e.g., redness or swelling).
- Severity score of 3 or severe mastitis: abnormal milk plus inflammation of udder plus sick cow (e.g., depression, poor appetite).

(6) **Displaced Abomasum.** Displaced abomasum is recognized when a ping is detected by thumping or tapping the cow’s body wall while simultaneously listening with a stethoscope in the area between the 9th and 12th ribs above and below an imaginary line extending from the hip to the elbow on each side of the animal on the abdominal wall. Displaced abomasum can occur on either the right or left side.

(7) **Pneumonia.** Pneumonia is recognized when a cow is observed with altered breathing patterns, respiratory sounds, or both, resulting from a respiratory infection. Most cases of pneumonia have a fever but some do not.

(8) **Lameness.** Lameness is recognized when a cow is observed walking or standing abnormally because of a problem in the foot, leg or hip.

(9) **Ovarian Dysfunction.** Ovarian dysfunction is recognized when a cow is examined and determined to have ovarian problems that are causing abnormal patterns of heat expression (showing heat too often or not showing heat at all).

(10) **Sold and Died.** The 30-d and 60-d culling and mortality risks are commonly used monitors of fresh cow “performance” today but this approach is fraught with problems and usually should not be used. Use of early lactation culling is confounded by herd management issues, is highly subject to sample size constraints in terms of accuracy, and really has very little utility in the area of transition monitoring. Instead, herds should strive to
develop better disease prevention and treatment and monitoring protocols.

**Disease Incidence Risk Calculation.** Disease frequency is most commonly calculated as a cumulative incidence where the numerator is a count of the first event of a lactation occurring during the first 30 days in milk (technically this is known as the incident case) and within a specified calendar time period of "X". Time period "X" refers to a specified calendar period that is the same for both the numerator and denominator. This duration of time could range from 1 to 12 months depending upon the size of the herd and the specific question being asked. Time period “X” is commonly stratified by month of calving, but in larger herds it may be useful to stratify by week of calving.

- The denominator is the population of cows at risk during time period “X”. Commonly for on-farm record systems, lactations initiated would be a simple count of the FRESH events during a specific period of time.
- Care should be taken to ensure that cows have an adequate time at risk (most commonly the first 30 days in milk) to be included in the cumulative incidence calculation.

**Energy and Protein Requirements during Early Lactation.** Some operations feed a fresh cow ration that is higher in protein, higher in fiber, and moderate in carbohydrate level, whereas others prefer to feed fresh cows the normal lactating diet immediately following calving.

- Ensure an adequate level of fiber intake by feeding total NDF levels at 32% or greater (Lean et al., 2013).
- Strive for a positive metabolizable protein balance (250 to 600 g above requirements depending on the approach taken and the specifics of each ration balancing program), and make sure to maintain a balanced carbohydrate blend to favor propionate production while maintaining a healthy rumen (i.e., starch levels of 24-26%; Lean et al., 2013).
- If a high protein fresh cow ration or perhaps a lower energy/lower carbohydrate fresh cow ration is utilized, monitor days in the fresh pen to ensure that cows are moved out of the fresh pen by 10 to 14 days in milk to avoid excessive weight loss.
- Monitor the forage quality to ensure that it is free of mold, mycotoxins, and that fermented feeds have the proper fermentation profiles.
- Pre-batch mix and chop hays to control length to no larger than 2 to 3 inches to minimize sorting and monitor particle size.
- Monitor manure for fiber length, grain particles, and consistency.
- Monitor feed bunks to make sure that refusals are removed daily to minimize risk of feed intake depression from moldy or heated feeds.
- Provide a minimum of 4 linear inches of water trough access per cow divided into at least 2 locations in the pen (Smith et al., 2006).

**Energy Status Monitoring.** In order to meet the energy needs of the transition period, cows change how their bodies use glucose (essentially “sparing” glucose for the mammary gland and fetus at the sacrifice of other body tissues such as muscle) via changes in insulin sensitivity and increases in growth hormone concentrations. "Non-essential tissues" (i.e., tissues that don’t support milk production) must derive a larger percentage of their daily energy needs from mobilized fatty acids. If a successful transition and adaptation to changing demands is made, cows will experience mild increases in the concentrations of non-esterified fatty acids during the last 10 days of gestation that will carry over into early lactation. Cows that successfully transition into lactation will not experience appreciable hyperketonemia before calving, although the concentrations of β-hydroxybutyrate (a ketone body, abbreviated as BHBA) will moderately increase during early lactation, but generally remain less than 1,000 to 1,200 μmol/L (Duffield et al., 2009). In contrast, if cows fail to successfully manage the
demands of the transition period, excessive breakdown of fat and mobilization of fatty acids from their fat stores will occur leading to fatty liver, poor immune response, poor glucose production, hyperketonemia above 1,200 to 1,400 μmol/L, increased risk of disease, increased risk of premature culling, and decreased reproductive performance.

- Sample 15 to 20 cows between 3 and 9 days in milk for BHBA concentration. If there are insufficient cows to meet the sample size, the window of sampling can be extended to 16 days. Goal: ≤ 15% with BHBA ≥ 1,200 μmol/L.
- Milk components also can be used at the herd level to indicate potential transition issues. Fresh cows that mobilize excessive body fat will often demonstrate greater than normal percentages of butterfat. On an individual cow basis, use of either first test fat percentage or fat:protein ratio is not very sensitive for identifying cows at risk for hyperketonemia. At the herd level, however, examining the fat:protein ratio at first test can provide valuable information.
- Calculate fat:protein ratio for cows when days in milk at the first test are 10 to 40. If 40% or more of this population has a fat:protein ratio ≥ 1.4, further investigation is warranted.
- Another approach is to look at first test fat percentage alone. In this case, if > 10% of cows have an excessively high first test fat percentage, further investigation may be warranted. Cut-points used by the authors for quick screening are 5.0 for Holsteins and 6.0 for Jerseys.

**Milk production.** Early lactation milk production is not a direct predictor of future reproductive efficiency *per se*, but strong starts to lactation usually indicate healthy transition cows with good appetites, and more often than not, these cows are those most likely to cycle early and go on to reproductive success.

- First test milk is the earliest production data that can be used to evaluate early lactation performance and the impact of transition programs. This approach, however, is subject to the impact of days in milk at the first test. To correct for this confounding factor, in large herds first test milk can be limited to only evaluating cows that experience first test between 15 and 30 days in milk (or some comparable range).
- A useful approach that has gained in popularity is the use of Week 4 Milk. In DC305, an estimate of milk production during the 4th week can be calculated using item type 122 (weekly average milk on week “X” where “X” equals 4). This estimate will include data from more cows than only evaluating first test for cows that tested between 15 and 30 days in milk and can be used to illustrate the impact of seasonal changes during early lactation, as well as showing the impact of management changes.
- A quick, crude approach using early lactation milk production to assess how well a group of cows has performed is to calculate the percentage < 100 days-in-milk that are below some minimum cut-point of production. For example, with first lactation cows, the desired goal may be less than 10% of the cows producing less than 50 lb of milk at test date during the first 100 days. In mature cows, the goal would be to have less than 10% of cows producing less than 70 lb of milk at test date for cows in the first 100 days in milk. Rather than simply evaluating how well a herd has performed this month based on the percentage of early lactation cows that are below 50 or 70 lb, it may be more valuable to plot trends across time within a herd by parity group. Monitors such as these do not point to any specific causes or impacts on reproduction, but rather indicate the potential for any number of problems are likely to have carry-over effects on total lactation and reproductive performance.
Cow Comfort—Standing Times. The goal is to maximize cow comfort to promote more lying time and to minimize additional metabolic needs associated with excessive standing and or walking. Fresh cows are at increased risk of lameness or laminitis resulting from the influence of periparturient hormonal changes that may negatively impact foot and leg tissues and pen, ration, and feed intake changes. As with other animals, mud and heat stress increase metabolic needs but decrease feed intake. Adequate space for resting that is clean and dry is essential for these fresh cows.

- Typical space requirements vary with the type of housing system, but general guidelines are to provide approximately 150 sq ft per cow in bedded packs, 500 to 600 sq ft per cow of loafing area along with 50 to 75 sq ft shade area per cow in open corrals, or at least one properly bedded and maintained freestall per cow if using freestall housing (preferably providing 10 to 15% more stalls than cows if possible to optimize resting times; Graves, 2006, Smith et al, 2006).
- Monitor time budgets for fresh cows. Minimize lockup times in stanchions. Ideally, cows are locked for no more than 30 to 45 minutes per day for monitoring or other management needs.

Body Condition Score. All lactating cows are expected to lose some weight post-calving. Normal weight loss during first 30 days should be ≤ 0.75 BCS or approximately 90 lbs (1 BCS = 120 lbs of fat and protein).

- First-service conception risk may be reduced by 50% when BCS decreases by more than 1.0 score during the first 60 days in milk.
- Risk of a prolonged anovulatory condition (failure to cycle) increases in cows whose BCS falls below 2.75 or who lose excessive condition during the early postpartum period.

Conclusion

Transition performance is critical to the success of any dairy. Key components of successful transition include implementation of herd management guidelines that focus on prevention of periparturient problems, real time monitoring of key processes that impact the prepartum and the postpartum periods (leading indicators), and evaluating the results of the program by the consistent examination of key outcomes (lagging indicators). Without attention to monitoring processes and working towards prevention of problems, efforts by management become reactionary in nature and the dairy is forced into damage control mode. The points covered in this paper are not an exhaustive list of all possible transition management issues or of all the possible approaches to monitoring transition performance. Each herd may have specific approaches that work well. Consultants all have their preferred approaches for evaluating performance. High-quality records and their appropriate use are vital to the evaluation of how well cows are transitioning into lactation, but one must always remember there is no substitute for direct observation of the cows and their environment. When proper preventive management is combined with real-time monitoring, the result should be an improved transition program and increased lactation and reproductive success.

Literature Cited


