

Transition Management Checklist

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Many dairy herds today are frustrated by transition management challenges that affect early lactation performance for cows in herds of all sizes. The transition period, which extends from approximately 3 wk prior to calving until approximately 3 wk post-calving, is a high-risk time in a cow's life. Based on data collected by the authors, cows on many dairies experience a high risk for early lactation herd removal. Unfortunately, on many dairies, 10 - 11 % of all cows leave the herd within the first 60 d of calving through culling or death. Once cows sold for dairy purposes are removed from the equation, achievable goals should be less than 6 - 7 % during this same time period.

The transition period is a critical time in cows' lactations with long lasting carry-over effects that extend far beyond a high risk of culling. There is a well documented depression in the immune function during this 6 wk period related to a combination of issues including subclinical hypocalcemia as well as protein, energy, mineral, and vitamin challenges. Dry matter intake (**DMI**) may drop by 25 % or more and the presence of various environmental, social, or feed related stressors may further compound the compromised DMI and immunity. Early lactation milk production, risk for contracting infectious diseases with subsequent antibiotic treatment, return to positive energy balance, and reproductive efficiency are all related to the success of the transition period.

Veterinarians, nutritionists, and outside consultants are often asked to investigate, correct, or otherwise deal with the resulting problems caused by transition failures. For example, herds that struggle with poor reproductive efficiency may implement massive changes in the breeding program including the firing of commercial or on-farm inseminators. Nutritionists may be called regarding poor fresh cow milk production or poor peak performance. Often, these production and reproduction problems are the result of mismanagement that occurred at least 3 to 6 wk previously.

Examples of management issues that may lead to production problems include:

- Overcrowded close-up dry and fresh cow pens;
- Inadequate heat stress abatement; and
- Rations that were improperly balanced, not delivered as per the nutritionist's recommendations, or were sorted by the cows.

Unfortunately, key herd advisors at times may resort to finger pointing and playing the *blame game*. However, each member of the herd management team has specific roles. Complete buy-in and cooperation from all members of the management team, as well as a concerted management effort targeted at prevention of periparturient problems is necessary to ensure the financial success of dairy enterprises.

The following checklist was designed to offer some guidelines to help veterinarians, nutritionists, consultants, and owners/managers improve the management of transition cows with an eye on improved early lactation performance, decreased risk of premature culling, and improved reproductive success. It is not meant to be an exhaustive list of all possible transition issues, but merely to serve as an aid in the investigation of problems and in improving the day-to-day management. At the end of the paper is a list of references which are suggested reading for those that would like additional information.

GROUPING AND PEN MOVEMENT

Goal: The goal is to reduce the social, environmental, and metabolic stressors by minimizing the number of pen changes a cow is forced to make. Keep it simple - avoid unnecessary pen changes, as each pen move is likely to result in a drop in DMI and elevated cortisol levels; both of which may negatively impact immune function and overall health and productivity.

- When moves are necessary, decrease the impact of pen changes by moving animals once weekly and move in groups of 10 or more animals, if possible.

- Avoid moving cows into new pens during the last 10 d prior to calving. Ideally, cows should spend at least 14 d in the close-up pen.
 - Due to the inevitable variation around calving dates, in order to have at least 90 % of cows spend at least 10 d in close-up pens, the average days in close-up should be 23 to 24.
 - When moving cows from far-off dry to close-up pens on a weekly basis, set up the report to list cows that are 21 to 27 d prior to expected calving.
 - If possible, target slightly longer days in the close-up pen for cows known to be carrying twins or cows that are dry during summer heat stress conditions, as they are expected to experience shorter gestation periods and will usually calve earlier.
 - In these high risk animals, set the report specifications to move cows at 28 – 34 d prior to expected calving.
 - In the West, many herds house close-up cows in dirt lots with covered shade structures. In this situation, cows usually calve in the same lot, negating the need for a maternity pen unless dystocia is suspected.
 - One alternative, that is gaining in popularity, is the system of bedded packs for close-up and maternity cows. Cows do not move to a maternity pen, but instead calve in the same pen in which they are housed throughout the close-up period. The advantage is fewer pen changes and less need for an hourly walk-through. However, space per animal is important (~100 ft²/cow), as is attention to bedding maintenance.
 - If maternity pens are used, strive to move only at impending parturition, i.e., feet showing or other obvious signs of active labor. Moving cows during early parts of stage 1 labor may result in an increased risk of stillbirth. Animals should spend less than 12 hr in a calving pen.
 - In order to make this plan work, close-up pens must be closely monitored around the clock. A maternity worker should walk the pens approximately once every hour or two and move cows displaying signs of active labor. Facilities should be designed to allow a single worker to calmly move an animal from close-up to maternity pen without additional help and without undue stress on the animal or her pen mates.
 - Waiting until active parturition to move cows from a freestall, dry cow pen into a maternity pen usually results in some cows calving in the freestalls. Cows vary in duration of active labor and some cows, especially older cows, spend very little time in active labor. Inevitably, even with very experienced workers, walking pens every hour will result in missed animals. As a consequence, expect about 10 % of calvings to occur outside of the maternity pen (i.e., in the freestalls). Workers should be prepared to properly and promptly assist these calves.
- Separate heifers and older cows if possible.
 - Heifers have been shown to have longer resting times and higher DMI when separated from mature cows.
 - Some researchers feel that heifers need higher levels of protein during the close-up period (> 15 % or 1100 - 1200 g of metabolizable protein) as compared to mature dry cows.
 - Feeding DCAD diets to springing heifers is not usually required, since they are not as susceptible to clinical hypocalcemia and are less affected by subclinical hypocalcemia than mature cows; but some herds report improved performance with DCAD diets for heifers.
- Maintain the stocking density at less than 100 %, based on feed bunk space.
 - Provide ~ 30 in of bunk space per animal or, in pens with lock-ups spaced at 24 in, populate the pen at 80 - 85 % of the number of lock-ups.
 - Producers often hear conflicting information regarding the pros and cons of using self-locking stanchions in transition cows.
 - Pros:
 - Lock-ups at the feedbunk provide more defined feeding areas and may reduce feed wastage from behaviors such as feed tossing.
 - Increasing evidence that there is a reduction in displacement of subordinate cows by dominant cows from the feed bunk when stanchions are in place as compared to post-and-rail feeding systems.
 - Lock-ups can dramatically improve labor efficiency, but make sure to remain aware of the cows' time budgets and the damage that may

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- be done as a consequence of prolonged lock-up times.
- Cons:
 - Cost is probably the biggest drawback.
 - A handful of cows may not comfortably use stanchions and may need to be sold to another dairy or moved to a pen that has open feeding areas.
- Set realistic lock-up expectations (large, wide-bodied dry cows will not use all of the slots when stanchions are 24 in wide, i.e. 5-in-10 stanchions).
- Instead of relying on a count of lock-ups, strive to always provide 30 to 36 in of feed bunk access per cow in the close-up and fresh cow pens.
 - The easiest way to accomplish the desired stocking density is to count cows vs. bunk space on the day of move into the close-up pen. If there are 28 to 30 in of useable bunk space/cow on the day of the move, as cows calve and move to other pens, the feed space/cow will only increase throughout the week.
 - Due to 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 a 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 in of bunk space per cow < 2 to 3 % of the time, based on the herds evaluated.
- Maintain a clean, dry environment.
 - Mud and heat stress increase metabolic needs, but decrease feed intake.
 - Wet, mucky conditions also increase the risk of mastitis that may not appear until later in the fresh pen.
 - Cows calving in wet conditions may experience higher risks of metritis.
 - Maternity pens should be bedded with clean, dry material and changed frequently.
- Frequency of rebedding will depend on a variety of issues such as: stocking density, bedding type, weather conditions, etc. Striving to maintain a clean, dry area results in cows maintaining good hygiene scores.
- Following calving, cows should be housed in a colostrum pen, instead of a hospital pen, until milk is free of dry cow antibiotic residues and legal for sale.
- Minimize distance walked in these tired and sore fresh cows by placing the pre- and post-fresh pens close to the parlor, if possible.
- Design move lanes and coordinate cattle movement to eliminate lock-out time that keeps cows away from feed.

NUTRITION AND FEED DELIVERY

Goal: The primary feeding management goal during the prepartum period is to minimize the inevitable drop in DMI that occurs prior to calving. Feed intake, energy balance, and the magnitude of change in both are associated with changes in immune function, risk of developing retained placenta and metritis, and postpartum feed intake.

- Close-up cows:
 - Energy and protein requirements during the last week of gestation are estimated to be approximately 15 Mcals NE_L and 1100 g of metabolizable protein/d, respectively.
 - It is beyond the scope of this paper to adequately describe the various strategies and guidelines for balancing rations, but there are a few basics worth mentioning:
 - Ensure an adequate level of fiber intake by feeding 7 to 7.5 lb of forage ADF. Make sure cows are actually consuming the ration provided by using a Penn State Particle Separator to evaluate fresh feed vs. refusals.
 - Increase metabolizable protein to approximately 1100 g/d (corresponds to a positive balance of 400 to 450 g of metabolizable protein in some ration balancing programs)
 - Be careful with fermentable carbohydrate levels – keep total

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- NFC to less than 30 to 32 % and starch at approximately 14 - 18 %.
- Consider feeding monensin in the transition diet as an approach to improve feed efficiency and reduce the risk of subclinical ketosis. Recommended levels usually range from 300 to 400 mg/head/d.
- Consider feeding rumen protected choline (Reashure[®]) at 2 oz/head/d during the close-up and fresh periods, especially if there are more fat cows than normal, to improve the liver's ability to export fat out of the liver in the form of VLDL and to potentially reduce BHBA and NEFA levels as well as to increase milk production and first service success.
- Monitor feed intake - this is one of the simplest monitors of change in performance (and predictors of future performance), but yet is most often overlooked.
 - Weigh feed delivered to close-up and fresh cow pens daily.
 - Weigh feed refusals from close-up and fresh pens daily.
 - Target a 5 % refusal (or more) on a daily basis, but ensure that the ration is not easily sortable by grinding hays to less than 3 in long and adding water if necessary.
 - Based on a typical 21 to 24/d average in close-up pen, shoot for a DMI of > 26 lb for mature Holsteins (> 18 lb for mature Jerseys) and > 23 lb for Holstein heifers (> 14 lb for Jersey heifers).
- If using dietary cation-anion difference (DCAD) diets for close-up cows:
 - Select forages, grains, and grain by-products that are low in potassium to minimize the amount of anionic salts needed.
 - Monitor urine pH once weekly from 10 to 15 cows while feeding a DCAD diet. The goal is to have all cows at a pH of 6.0 to 6.9 following at least 48 hr on the diet. Many people monitor the average pH, but the average can be very misleading, especially in situations where cows are sorting the ration and some animals have a high pH while others are too low. Overacidification (urine pH < 5.8) may result in depressed DMI and perhaps compromised immune function; while inadequate acidification (urine pH > 7.2) can lead to severe, non-responsive downer animals following calving. Either scenario can also result in an increase in retained placentas.
- Feed additional vitamin E to close-up and fresh cows. Vitamin E has been shown to improve immune function and decrease the risk of retained placenta, metritis, and mastitis in fresh cows. Specific levels to feed depend upon type of diet and feed ingredients but many consultants recommend levels of 1800 to 3000 IU/d in these high risk cows.
- Fresh cows:
 - Energy and protein requirements during early lactation change dramatically as milk production increases. After the prescribed withdrawal time, move cows from the colostrum pen to a fresh cow pen for ~ 10 to 21 d. Duration of time in fresh pen is dependent upon preferred feeding strategy, ability to feed a special fresh cow ration, and calving pressure. Once again, it is beyond the scope of this paper to adequately describe the various strategies and guideline for balancing rations, but there are a few basics depending on the management/feeding option chosen:
 - Option 1 – short duration in fresh pen (10 to 14 d) with more aggressive protein feeding followed by move to normal high cow ration at 10 to 14 d in milk.
 - Ensure an adequate level of fiber intake by feeding approximately 7 lb of forage ADF with total NDF levels at approximately 32 %.
 - Increase metabolizable protein balance to a positive 500 to 600 g.
 - Maintain correct blend of carbohydrates to drive propionate production, but keep total NFC at 35 to 38 %. (Note, some programs will report a higher level of NFC on the same diet as compared to other ration balancing programs. Check on the suggested requirements for the program you are using, but in general, most feed a slightly lower level of NFC to these postpartum cows and then increase the level as they move along in lactation.)

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- Option 2 – move cows onto regular high cow ration.
 - Ensure an adequate level of fiber intake by feeding 7 to 7.5 lb of forage ADF with total NDF levels at approximately 30 to 33 %.
 - Shoot for metabolizable protein balance of positive 250 to 400 g through first 100 d in milk (**DIM**).
 - Feed a balanced carbohydrate blend of approximately 23-24 % starch, 4.5 to 5 % sugars, and 9.5 to 10 % soluble fiber.
- In both scenarios, the goal is to ensure an adequate level of fiber intake to maintain rumen health while still providing the proper mix of fermentable substrate and nitrogenous sources (protein) to increase microbial numbers and propionate, the driver behind glucose/ lactose production and subsequently, milk production.
- Continue feeding Rumensin® in the TMR at levels to provide 300-400 mg/head/d to improve feed efficiency and to aid in the management of subclinical ketosis.
- Monitor feed intake
 - Weigh feed delivered and leftover daily as both a monitor and predictor of fresh cow performance.
 - Dry matter intake of > 38 lb for Holsteins (> 27 lb for Jerseys) in mixed parity fresh pens (2-21 DIM).
 - Holsteins grouped by parity: 35 lb of DMI for lact = 1 and 43 lb of DMI for lact > 1
- Continue feeding higher levels of vitamin E as described previously if possible.
- Fat cows (≥ 4.0 BCS) are at increased risk of ketosis and often benefit from oral drenching. Consider 8 to 10 oz propylene glycol drench/cow/d at calving and again in 24 hr.
- Consider feeding rumen protected choline (Reashure®) at 2 oz /head/d during the close-up and fresh periods, especially if there are more fat cows than normal, to improve the liver's ability to export fat out of the liver in the form of VLDL and to potentially reduce BHBA and NEFA levels, as well as increase milk production and first service success.
- General principles:
 - Ensure uniform feed intake by all animals.
 - Monitor particle size using a particle separator.
 - Maintain a moisture content of ration between 48 - 55 % to help reduce sorting and increase palatability (may need to add water to some rations).
 - Monitor manure for fiber length, grain particles, and gas bubbles.
 - Pre-batch mix/ chop hays to control length to no larger than 2-3 in (i.e., less than the width of a cow's muzzle).
 - Use high quality, highly palatable hays free of mold and mycotoxins.
 - Use high quality, highly palatable silages free of clostridial or butyric acid fermentation problems. Do not feed silage from top and sides of silo to transition animals. Limit silages to no more than ~ 40 to 50 % of forage needs in pre-fresh cows.
 - Clean out feed bunks daily for both close-up and fresh cows to minimize risk of feed intake depression from moldy or heated feeds.
- Avoid overcrowding-Maintain the stocking density at less than 100 %, based on feed bunk space. (Provide ~30 in of bunk space per animal or in pens with lock-ups spaced at 24 in, populate the pen at 80 to 85 % of the number of lock-ups.)

FACILITIES AND COW COMFORT

Goal: 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 an increased risk of lameness/ laminitis due to the influence of periparturient hormonal changes that may negatively impact foot and leg tissues and due to pen, ration, and feed intake changes.

- Clean, dry and comfortable beds, lots or corrals.
 - Space requirements:
 - ~ 100 sq ft/ cow in bedded packs;
 - ~ 500 to 600 sq ft/ cow of loafing area and 50-75 sq ft shade area/ cow in open corrals; or
 - A minimum of 1 properly bedded and maintained freestall/cow, if using freestall housing, is important.
- Heat stress abatement is critical in both pre-fresh and fresh cows. Provide soaker lines on lock-ups during heat stress conditions that cycle once every 15 min from 70 to 79 °F, once every

10 min from 80 to 88 °F, and once every 5 min above 88 °F with 0.33 gal of water/cow/cycle.

- ❑ Minimize additional stressors by minimizing pen changes, maintaining low pen densities, separating heifers and cows, and by providing adequate water, bedding, nutrition, etc.
 - Provide a minimum of 3 linear inches of water trough access per cow divided into at least 2 locations within the pen.
 - Separate cows from heifers during pre-fresh and post-fresh periods to minimize antagonistic behavior toward heifers, encourage feed intake, and promote improved resting times.
 - Eliminate dead ends – temporary gates placed across freestall pens prevent cows from making an escape from larger boss cows and will often negatively impact both DMI and resting opportunities.
- ❑ Acclimate heifers to lock-ups/stanchions and concrete feeding aprons, if possible, prior to entering the close-up pen.

GENERAL ITEMS AND MONITORING

- ❑ All lactating cows are expected to lose some weight post-calving. Normal weight loss during the first 30 DIM should be ≤ 0.75 BCS or ~ 90 lb (1 BCS ~ 120 lb 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 DIM.
 - Risk of a prolonged anovulatory condition (failure to cycle) increases in animals whose BCS falls below 2.75 or who lose excessive condition during the early postparturient period.
- ❑ Use some form of a fresh cow monitoring and treatment program custom designed with your veterinarian to fit your farm's needs.
 - No one program fits all herds, but most herds benefit from some sort of evaluation program to assess appetite, attitude, and appearance of every cow in the fresh pen every day. Depending on the amount of labor available, as well as the quality of the labor, some herds need a rigorous fresh cow monitoring program to prevent cows from *falling through the cracks*. If some form of a 10-d monitoring program is utilized, careful attention should be paid to ensure

that fresh cows are not locked up for more than 30 to 45 min/d.

- Other herds that have very high quality herdsmen and fewer fresh cow issues may actually perform better with a prompted assessment approach instead of individually examining every fresh cow every day for the first 10 d of lactation.
- ❑ Record major, consistently defined fresh cow events such as milk fever, DA, RP, mastitis, metritis, lame, died, and sold in addition to freshenings.
 - Some events such as ketosis may be too subjective or prone to detection biases and are usually not as valuable to record. However, if recorded, monthly ketosis incidence can be used to evaluate employee performance.
 - Retained placenta risk, calculated on a weekly or monthly basis, can be a very good monitor of both preparturient feed intake as well as a predictor of future metritis risk.
 - Monthly risk of displaced abomasum (**DA**) (number of DA divided by number of fresh cows at risk) can also be helpful to indicate transition problems, but this metric suffers from more lag than RP risk.
 - In general, the following fresh cow event risks are achievable goals for most operations:
 - Milk fever – less than 3-5 % of mature cow calvings,
 - Displaced abomasum – less than 3-5 % of all calvings, and
 - Retained placenta – less than 8 % of all calvings.
- ❑ Close-up urine pH and overall feed intake are 2 of the best predictors of future fresh cow problems.
- ❑ Many herd owners and consultants like to monitor fresh cow culling/ death risk. Following calving, less than 5 % sold and 2 % dead during the first 60 DIM (expressed as total sold for non-dairy purposes or died/ total calved) are achievable targets; but this metric also suffers from lag to a greater degree and occurs too late to take action for affected cows. Also, some herds tend to play games to make this number look good by waiting until the next 30 d window to cull poor doing animals.
- ❑ When animals fail to peak—check total DMI and ration protein levels. Fresh cows need to rapidly increase feed intake and need adequate levels of

- high quality protein (more specifically amino acids) in order to achieve high peaks.
- In general, heifers should peak at ~ 75 to 80 % of mature cow peaks.
 - Based on monthly test data, mature cows will typically peak at 50 to 75 DIM, but heifers will peak later (90 – 120 DIM). In general, as milk production increases, DIM at peak increases slightly. Also, herds using rBST will also peak later, especially first lactation animals.
- ❑ When animals fail to persist—check body condition changes, DMI, and total ration energy levels. Persistency is usually related to total energy intake.
 - First lactation animals should have higher persistency than mature cows – 94 to 96 % persistency (or 4 to 6 % decline/mo) as compared to mature cows with 90 to 93 % persistency (or 7 to 10 % decline/mo).
 - ❑ Heat stress conditions narrow the margin for error.
 - Total feed intake decreases, but maintenance requirements for energy are increased,
 - More time spent standing (higher risk for lameness),
 - Shorter gestation lengths,
 - Higher risk for RP, and
 - Much higher risk for more severe metritis.
 - ❑ Fat cow problems should be addressed by strategic management of ketosis risk (propylene glycol drenching), reducing weight swings in transition period, and improving breeding management to reduce long days open. Some herds claim success from using a *reducing diet* for cows that dry off early due to low milk, excessive body condition, and long DIM; but this practice needs further research before making any recommendations.
 - ❑ Minimize lock-up times in stanchions – ideally, cows will be locked up for no more than 30 to 45 min/d for monitoring, breeding, vaccinations, urine pH, etc.
 - ❑ Early lactation milk production, first test milk or wk 4 milk production estimates are better monitors of transition performance than waiting for peak milk.
 - First test milk is the earliest production data that can be used to evaluate early lactation performance and the impact of transition programs. The lag for this approach is 1 to 3 mo shorter than relying on peak milk and allows for the inclusion of cows that may be culled prior to reaching true peak milk. However, this approach is subject to the impact of DIM at the first test. To correct for this confounding factor, in large herds first test milk can be limited to only evaluating animals that experience first test between 20 and 30 DIM (or some comparable range).
- A useful approach that has gained in popularity is the use of wk 4 milk. In DC305, an estimate of milk production during the fourth 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 20 and 30 DIM and can be used to illustrate the impact of seasonal changes in early lactation performance, as well as showing the impact of management changes.
- ❑ In herds with daily milk meters, changes in milk production can also be a good monitor, but results should be interpreted with caution. In general,
 - Cows should increase in milk flow by ~ 10 %/d for the first 14 d and
 - Heifers should increase in milk flow by ~ 6 to 8 %/d for the first 14 d.
 - ❑ Milk components can also be used at the herd level to indicate potential transition issues. Fresh cows that mobilize excessive body fat will often demonstrate higher than normal levels of butterfat. On an individual cow basis, the use of either first test fat percentage or fat:protein ratio is not very sensitive for identifying cows at increased risk of subclinical or clinical ketosis. However, at the herd level, examining the fat:protein ratio at first test can provide valuable information.
 - Calculate fat:protein ratio for cows with DIM at first test of 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 % have an excessively high first test fat percent, further investigation may be warranted. Cut-points used by the authors for quick screening are: 5.0 for Holsteins and 6.0 for Jerseys.

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