

The Five Key Factors in Transition Cow Management of Freestall Dairy Herds

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INTRODUCTION

The objective monitor Transition Cow Index™ (TCI; Nordlund, 2006) has allowed us to study the overall effectiveness of transition management programs across a wide range of dairy herds. In 2005, we surveyed the transition management practices of 50 Wisconsin freestall herds. The herds, some over 600 cows, were selected from a stratified ranking of herd average TCI values; meaning that equivalent numbers of herd were selected from each TCI category, i.e., <-1,500, -1,500 to -500, -500 to +500, etc. A wide range of management practices, housing characteristics, and animal evaluations were recorded. While the formal report of this survey has not yet been published, 5 factors emerged as the primary factors associated with herd average TCI scores.

The 5 factors that have emerged are:

- bunk space in both the pre-fresh and fresh cow pens;
- minimizing pen moves and social stress in the peripartum period, particularly during the 10 d prior to calving;
- increasing cow comfort through the period with amply sized stalls;
- sand resting surfaces on which to lie; and
- an efficient and effective screening process to identify cows needing medical attention or nursing care.

Further refinements of these factors have been made using clinical data gathered in field investigations of problem dairies by the Food Animal Production Medicine group at the University of Wisconsin. We are now using these 5 factors as the primary focal points as we work to improve fresh cow health with our clients.

FIVE FACTORS

Bunk Space

Sufficient space at the feeding fence for all transition cows to eat simultaneously appears to be the most important determinant of transition cow performance in our current industry. Essentially, we are recommending a minimum of 30 in of bunk space/cow in pre-fresh and post-fresh pens for a 90-min period after fresh feed is delivered and after every milking. For a discussion of these issues, please read the article referenced at the end of this section (Nordlund et al., 2006).

To determine feeding space/cow, it is important to measure the length of the feed fence. If the feeding fence is fitted with self-locking stanchions, do not assume that a cow can

feed in each stanchion. Our video studies show that lactating cows fill a row of 24 in headlocks to a maximum of 80% at peak feeding periods, regardless of the number of cows in the pen. This suggests that in fresh pens, cows will fill to a space of about 30 in. It is likely that prepartum cows would benefit from even more space than lactating cows.

Calculation of feeding fence space/cow in the transition pens on a single day may not represent the typical situation, because of the variation in the number of cows calving each week throughout the year. It will be helpful to estimate the typical stocking pressure in the pre-fresh and post-fresh pens. First, calculate the average number of calvings/wk by dividing the total number of calvings in the past year by 52. Multiply the average number of calvings/wk by the target number of weeks in the pen. If the feeding fence space goal of ~ 30 in/cow is reached with the average expected number of cows in the pen, then the pen will typically be over-stocked half of the time. In most situations, provision of space for 140% of the average expected number of calvings will meet the goals for bunk space more than 90% of the time. During periods of pressure, most dairy managers reduce the number of days that individual cows reside in these pens. However, it is preferable to minimize these adjustments of time in special management pens.

These recommendations for 30 in of space assume that the pens are equipped with lockups or other vertical dividers between feeding spaces. If the cows are fed at a post-and-rail feeder, additional space should be provided as dominant cows appear to clear subordinates sooner in these situations (Endres et al., 2005).

Pen moves and social stress

Each pen move requires that a cow familiarize herself with the surroundings, as well as re-establish a pecking order within the group (Hasegawa et al., 1997). More recent work has shown reduced time spent eating, increased feed evictions, and reduced milk yield following a pen move (von Keyserlingk et al., 2008). Minimizing the number of regroupings through the transition period is consistent with successful transition programs. In most situations, steps to reduce any moves will result in improved transition performance.

Cows are social animals. Isolation from the herd creates stress for a cow and separating a single cow into a separate calving pen for more than a couple of days appear to be high risk practices. However, movement into a new social group also creates stress as the cow establishes rank within the group. The first 2 d after a move into a new group are characterized by a dramatic increase in the number of agonistic interactions, most of them physical (Kondo and Hurnik, 1997). If no additional new cows enter the pen, the group becomes relatively stable.

A concept of *social turmoil profile* of a pen has been described (Nordlund et al., 2006). In pens where cows enter at intermittent intervals, like a week or more, extended stays in such pens are considered desirable. However, pens where cows enter and leave on a daily basis are considered to be in constant social turmoil and every effort should be made to minimize the time that prepartum cows spend in these pens.

Close-up pens

There are many different approaches to *close-up* and calving pens. The basic idea that we bring to an evaluation of pen moves is that there is a period of about 2-3 d of social turmoil within a pen after new cows enter. In the pre-fresh period, we want to minimize the risks for development of fatty liver and Type II ketosis.

The optimal entry policy for a close-up pen would be an *all-in* pen where a cohort of cows due to calve within a short period of time, such as a 1 wk to 10 d, are assembled with no further additions through the calving process. Less optimal would be weekly entries of new cows into the close-up pen; and even less attractive are daily entries of new cows into the pen, which result in pens of constant social turmoil.

We have begun to see dairies establish stable social groups as early as dry-off. Dry cow housing consists of a series of pens, each sized to hold approximately 15 to 20% of the total number of dry cows. Each pen is filled over a period of a week to 10 days and the group in each pen is kept together without the addition of new cows through calving.

Calving pens

Calving pens can refer to either a pen to which a cow is moved hours before delivering her calf or it could be a close-up pen where cows enter several weeks before their anticipated calving date and deliver the calf within the pen. If the calving pen has a stable social structure (no additions), extended stays are fine. If new cows are continually being added, we recommend that the duration of stay be limited to 48 hr maximum. Clinical data from field investigations by the Food Animal Production Medicine group at the University of Wisconsin show dramatic increases in ketosis and displaced abomasums and early lactation culling of cows that stay 3-10 d in daily-entry group calving pens (Nordlund et al., 2006). When cows are moved on a daily basis to daily-entry calving pens, they should be selected carefully so that minimal numbers spend more than 48 hr in these high turmoil pens.

It has become common to move cows to calving pens *when feet are showing*. Moving cows to calving pens once calving has begun effectively minimizes the time in high turmoil pens, but presents a new set of challenges. First, it requires round-the-clock labor to check and move cows. Freestall pens can be designed to facilitate this practice with the construction of two-row head-to-tail arrangements of the stall rows. With the tails of all cows visible from the central feed alley, the observer can monitor each cow without walking through and disrupting the pen. Second, workers must be monitored carefully in that they should not move cows into calving pens too early. In a report on moving cows when calving was imminent (Carrier et al., 2006), cows that were moved when in labor but with only mucus showing had 2.5 times the rate of stillbirths as cows that were moved when the calf's feet or head were showing. When the close-up cows are in freestalls, there is a tendency of laborers to move cows into calving pens too early. By moving cows into the pens early, fewer calves are born into the alleys and workers can avoid soiling their clothing when picking up slurry-covered calves.

Isolation pens, i.e., box stalls would appear to minimize social turmoil, but cows are social animals and separation from the herd is usually a stressful experience. If cows are moved to individual box stalls for calving, the duration of stay should be limited to a matter of a few hours.

Bedded pack *all-in* pens with the combined function of pre-fresh period and calving are considered optimal. There are several ways to achieve this goal, but a feasible strategy requires a minimum of 3 pens, one may be freestalls and the last two would be bedded packs. On a weekly move day, for example, the new group of cows on the calving pack would be 0-7 d before due date. The new cows on the second pack would be 8-14 d before due date, and the new group of cows in the close-up freestalls would be 15-22 d before due date. Cow groups stay intact as they move on a weekly basis from pen to pen. After calving, the individual cow and calf are removed and transferred to appropriate pens. To avoid the stressful experience of being left alone in a pen, the last two cows remaining to calve should usually be commingled with another pen when that situation arrives.

Ample sized freestalls or bedded packs

A deeply bedded pack is the preferred housing for close-up cows in confinement housing. The guideline of 100 sq ft of space/cow (Bickert, 2000) includes the bedded area only and assumes that cows have access to an external feeding alley or outside lot. If the feeding area is continuous with the bedded pack, the space should provide a minimum of 120 sq ft/cow with good bedding covering most of the area.

The pack should be sized to accommodate surges in cow numbers. The estimated number of cows calving/wk is estimated by the annual number of cows calving by 52 wk/yr. If the plan is to leave cows in a pen for 3 wk, the average pen population would be expected to hold 3 x the number of average calvings/wk. If the pen is sized to handle 140% of the average population, it will provide the goal space for each cow approximately 90% of the time.

If freestalls are used, sand is the preferred material because it presents relatively low risk for mastitis compared to organic products. However, any deep, loose surface will be an improvement over a hard surface. Mattresses covered with modest quantities of shavings or other materials are viewed as average, and any stall surface such as concrete or other firm packed materials covered with modest bedding should be considered a high risk to successful transitions.

Surface cushion

Prepartum freestalls, in particular, need to accommodate the ample dimensions of pregnant cows and allow for some clumsiness in their rising and lying motions. Stalls for prepartum Holsteins and Jerseys should be at least 50 and 45 in wide respectively. Length is the distance between the outer corner of the rear curb to the point where the stall surface touches the brisket locator. If there is no brisket locator, the total stall length is the stall resting length. This distance should be greater than 70 and 63 in for Holstein and Jersey cows respectively. Appropriate dimensions have been developed

for cows of other breeds and various sizes (Nordlund and Cook, 2003; Cook and Nordlund, 2005).

Evaluating the potential for *lunge*, *bob*, and *rise* should reflect assessments of 3 separate items in a freestall: a brisket locator that does not restrict rising motions including the forward swing of the front foot, freedom from impediments to the forward lunge of the head and shoulder, absence of bob zone obstructions, and the neck rail being sufficiently high and forward (Nordlund and Cook, 2003; Cook and Nordlund, 2005). For a stall to be considered low risk for Holstein cows, the total stall length should be at least 9 ft long with no obstructions to forward lunge and bob. If the stall is less than 9 ft, but the lower side rail is 11 in above the stall bed or less, it should allow side lunging and is considered an average risk for transition cows. If the stall is less than 8 ft and has obstructions to side lunging, such as lower divider rails greater than 13 in above the stall bed, the stalls present major risks to successful transition performance. Finally, the neck rail should be approximately 48-50 in above the stall surface.

Effective screening program for cows needing attention

While difficult to assess, the primary determinant of the fresh cow screening and treatment program is the quality of the people and how much they care for the cows. Facilities that allow easy restraint without exciting the cows is also critical to these programs.

The optimal screening programs appear to use some form of appetite assessment. The practices of the herdspeople of the elite transition programs in our survey study were remarkably similar:

- placement of fresh TMR while fresh cows were being milked,
- observation of them returning to the pen,
- self-locks engaged, and
- assessment of appetite and attitude.

Similarly, the herdspeople in the elite herds knew and cared about the fresh cows under their watch. Obviously, this requires both special people and facilities.

Back to the bunk space issue, it requires sufficient feeding space for all cows to eat simultaneously. Cows that do not lock-up, or cows that lock-up with suppressed appetite or signs of depression were examined. Other examination procedures including rectal temperature, observations for vaginal discharge, ketosis, displaced abomasum, lung sounds, etc., were conducted when primary assessments indicated further evaluation.

While formal screening programs in lockups for fresh cows are a desirable practice, the procedure needs to be efficient and not interfere significantly with the daily time-budget of the fresh cows. Screening procedures that lock cows up for a period of 1 hr or less/d are considered optimal. While cows are quite capable of compensating for a 1-2 hr change in routine, if lock-up is prolonged and in association with other stressors, such as overstocking, then the ability of the cow to compensate and *catch-up* on lying time

may be exceeded. Cooper et al. (2007) showed that when cows were deprived of lying for 2-4 h/d, they only managed to recover approximately 40 % of the lost lying time by 40 hr after the deprivation. Extended lockup time adds substantially to the stresses of transition.

The location of the screening procedures has a substantial impact on the time constraints. If the cows have access to feed while being examined, feeding and the screening can proceed almost simultaneously. Screening time at a palpation rail, for example, must be weighted as riskier than equivalent time in lockups over feed.

This antagonism between holding time and the thoroughness of the screening procedure puts some severe constraints on the fresh pen.

DISCLAIMER

Obviously, this list is not comprehensive. There will be many potential risks to individual transition programs that are not listed. However, the risk factors presented here are considered to be common problems in today's intensively managed freestall dairies.

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