Transition Cow Management and Monitoring Checklist

Michael Overton, DVM, MPVM
Associate Professor, Dairy Production Medicine
University of Georgia, College of Veterinary Medicine
moverton@uga.edu

Management Timeline for Dairy Cattle

Dry-off
Far dry period
Close-up
(3 weeks prior to calving)
Calving
Fresh period
(3 weeks after calving)
Lactation
Milk Production
Reproduction

Dairy Cows Undergo Extreme Energy Balance Challenges Around the Transition Period

- Often, dramatic drops in prepartum DMI (20-40%)
- Increasing glucose demand - fetus, then milk
  - Uterus consumes ~ 50% of glucose, ~ 70% amino acids
  - Lactation demands ~ 3 X more glucose, ~ 2 X more amino acids
- Ration changes, pen changes
- Lagging increase in DMI after calving, resulting in...
  - Negative energy balance: -10 to -15 Mcal/ d (or more)
  - Negative protein balance: -500 to -600 g/d (or more)
Another, Separate Issue: Hypocalcemia Impacts a Variety of Processes in Fresh Cows

- DMI of fresh cows
- LDA's, early lactation milk production
- Uterine involution (i.e., may ↑ risk of metritis)
- Neutrophil function (i.e., may ↑ risk of metritis or mastitis)

<table>
<thead>
<tr>
<th></th>
<th>Hypocalcemia</th>
<th>Normocalcemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma Ca (d-0)</td>
<td>7.2 mg/dl</td>
<td>8.3 mg/dl</td>
</tr>
<tr>
<td>By day 21:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSCC</td>
<td>3.5</td>
<td>2.1</td>
</tr>
<tr>
<td>BCS loss</td>
<td>0.5</td>
<td>0.25</td>
</tr>
<tr>
<td>Clinical ketosis</td>
<td>49%</td>
<td>14%</td>
</tr>
</tbody>
</table>

W. G. Chamberlin et al., 2009 ADSA

Transition Cow Checklist – Developed as an Aid/ Starting Point to Review Management

- Goal – provide guidelines that would positively impact the health, productivity and profitability of transition cows
  - Rapidly increase feed intake after calving – more milk
  - Less likely to develop fresh cow disease issues
    - (Metritis, ketosis, LDA, etc)
  - Less likely to leave the herd prematurely (culled)
  - More likely to begin normal cyclicity sooner
  - Serve as an aid in the investigation of problems

Key Areas on Which to Focus

- Pen moves
  - Eliminate unnecessary moves
  - Avoid moving during last 10 days prior to calving
- Nutritional management and access
  - Stocking density/ bunk space in close-up and fresh pens
  - Avoid overfeeding energy in far dry and close-ups
  - Pay attention to fiber intake throughout
- Cow comfort
  - Maintain adequate, comfortable, dry area for resting
  - Avoid prolonged, idle standing times
- How do we MONITOR to assess change?
Grouping and Pen Movement

- **Goal:** reduce the social, environmental and metabolic stressors by minimizing the number of pen changes and the impact of each move.

- **Impact of pen changes - social and nutritional stress:**
  - Maximum effect on feeding behavior is in first hour
  - Generally expect a 2.5-5% reduction in milk production
  - Social impacts lasts ~ 3 days
  - May impact both the new cows and the established ones

  (Grant and Albright, 2001; Friend et al., 1977, Albright, 1978)

Grouping and Pen Movement Suggestions:

- Try to avoid moving cows during last 10 days before calving (strive for > 14 days in close-up pen)
- Depending on the herd, may need to target for an avg DINCU ≥ 23 in order to ensure most cows have adequate time in close-up

In this data set:
- ~ 64% of cows spent 14 - 30 DINCU
- ~ 90% spent 10 - 40 DINCU

DINCU and Metabolic Disease
(13,000 cows in 5 herds)

In R.B. Corbett
**DINCU and Reproduction - Demo**

- Mature cows with $p_{DCC} = 270 - 290$
- Group 1 - normal DINCU ($n = 927$)
  - PR = 19%
  - 26,654 lbs 305me
  - Early culling: 7.5% (6 - 10%)
- Group 2 - short DINCU ($n = 122$)
  - PR = 15%
  - 24,375 lbs 305me
  - Early culling: 10% (5 - 17%)

**Close-up Moving Strategies**

- Most of year:
  - LIST ID DCC DUE FOR DCC>257
  - Cows moved weekly
  - Expected range of 258 - 264 DCC (projected avg = 21)
- Summer list:
  - LIST ID DCC DUE FOR DCC>250
  - Cows moved weekly
  - Expected range of 251 - 257 DCC (projected avg = 28)
### DINCU Details for Mature Cows in Southeast Dairy

<table>
<thead>
<tr>
<th>Month</th>
<th>DINCU PCT</th>
<th>Count</th>
<th>Total</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>11%</td>
<td>6</td>
<td>57</td>
<td>5-20</td>
</tr>
<tr>
<td>Jun</td>
<td>12%</td>
<td>12</td>
<td>158</td>
<td>7-20</td>
</tr>
<tr>
<td>Jul</td>
<td>13%</td>
<td>12</td>
<td>96</td>
<td>7-15</td>
</tr>
<tr>
<td>Aug</td>
<td>4%</td>
<td>5</td>
<td>115</td>
<td>2-15</td>
</tr>
<tr>
<td>Sep</td>
<td>2%</td>
<td>2</td>
<td>121</td>
<td>0-6</td>
</tr>
<tr>
<td>Oct</td>
<td>9%</td>
<td>9</td>
<td>155</td>
<td>5-16</td>
</tr>
<tr>
<td>Nov</td>
<td>11%</td>
<td>11</td>
<td>53</td>
<td>7-15</td>
</tr>
<tr>
<td>Dec</td>
<td>11%</td>
<td>12</td>
<td>107</td>
<td>7-15</td>
</tr>
<tr>
<td>Jan</td>
<td>12%</td>
<td>13</td>
<td>81</td>
<td>7-21</td>
</tr>
<tr>
<td>Feb</td>
<td>14%</td>
<td>8</td>
<td>56</td>
<td>7-21</td>
</tr>
<tr>
<td>Mar</td>
<td>2%</td>
<td>2</td>
<td>64</td>
<td>1-11</td>
</tr>
<tr>
<td>Avg</td>
<td>9%</td>
<td>90</td>
<td>998</td>
<td>7-11</td>
</tr>
</tbody>
</table>

### Grouping and Pen Movement Suggestions:

- If possible, target longer DINCU for cows with twins or cows dry during summer heat stress.
- Decrease impact of pen changes by moving groups of 10 or more at a time.
  - Moving in afternoon or early evening may decrease impact.
- Separate cows and heifers if possible.
  - Higher resting and eating times when heifers separated.

(Albright, 1978)

### Stocking Density

- Access to feed for all cows at the same time is the key as is the ability to freely rest comfortably.
- In 1st lactation animals stocked at 80% of stall numbers as compared to 120% stocking density:
  - ~33" feedbunk vs 22" in a 4-row barn
  - 6.5 lb per day increase in milk production over the first 80 DIM
- Minimum of ~30" of bunk space is recommended for the pre-fresh group.

(Dr. Ken Nordlund)
Grouping and Pen Movement Suggestions:

- Strive to provide ~30” of bunk space per animal in close-up and fresh pens
- Watch out for seasonal changes in calving patterns
- Analysis of herd calving patterns (Ca, Co, NC, & Ga)

<table>
<thead>
<tr>
<th>Allowed Bunk Space</th>
<th>Avg %</th>
</tr>
</thead>
<tbody>
<tr>
<td>(% of Avg # Calving)</td>
<td>Overcrowded</td>
</tr>
<tr>
<td>100%</td>
<td>48%</td>
</tr>
<tr>
<td>110%</td>
<td>33%</td>
</tr>
<tr>
<td>120%</td>
<td>26%</td>
</tr>
<tr>
<td>130%</td>
<td>16%</td>
</tr>
<tr>
<td>140%</td>
<td>9%</td>
</tr>
<tr>
<td>150%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Nutrition and Feed Delivery

- Goals:
  - Minimize the inevitable drop (and impact of the drop) in DMI that occurs prior to calving
  - Maximize rise in DMI after calving
  - Limit the negative impact on liver health
Nutrition and Feed Delivery

- General concepts:
  - Ensure adequate fiber intake (7-7.5 lbs forage ADF)
  - Watch sortability - Grind hays to ~ 2-3"; add water if needed
  - Maintain proper level of metabolizable protein & balanced sources of carbohydrates (NFC)
  - Target a 5% refusal (orts) or more on a daily basis
  - Feed increased levels of vitamin E pre- and postpartum
  - Limit silages to no more than 40-50% of prefresh forage

Specific Additives for Consideration in Transition Nutrition

- Rumensin - 400 mg/ cow/ day
  - Support higher propionate levels
  - Potential way to reduce risk for hyperketonemia
- ReaShure - 60 grams/ cow/ day
  - Improve liver health via increasing synthesis and secretion of VLDL's
- Both should be fed throughout close-up and fresh period

Housing Keys

- Provide clean, dry, comfortable housing
  - Mud or heat stress increases maintenance needs but decreases DMI
  - Wet, mucky conditions increase risk of mastitis and metritis
- Housing options:
  - 1 comfortable, easy-to-use sand-bedded stall per cow or
  - 100 sq ft of bedded pack per cow or
  - 500-600 sq. ft. loafing area + 50-70 sq ft. shade per cow in dry lot dairies
- Minimize walking distances (to/ from parlor for fresh cows)
- Minimize lock-up time and time away from pen (holding pen/ milking for fresh cows)
Maternity Management

- Individual calving pens can be great, but be careful.
- Ideally, cows...
  - Are moved in a stress-free manner during early labor.
  - Are maintained in an individual maternity pen/stall only long enough to calve.
  - Avoid "solitary confinement".
  - Practice good sanitation.

Time Mis-Management (Cow's Perspective)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (hrs)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milking</td>
<td>2-3</td>
<td>(5)</td>
</tr>
<tr>
<td>Eating/Drinking</td>
<td>5-6</td>
<td>(4)</td>
</tr>
<tr>
<td>Socialization/Walking</td>
<td>2-3</td>
<td>(2)</td>
</tr>
<tr>
<td>Standing in stalls</td>
<td>1-2</td>
<td>(1)</td>
</tr>
<tr>
<td>Forced lockup</td>
<td>&lt;1</td>
<td>(2)</td>
</tr>
<tr>
<td>Lying</td>
<td>12-14</td>
<td>(10)</td>
</tr>
</tbody>
</table>

- Consider:
  - 2-8 lb milk loss
  - Extra 0.25 to 0.75 BCS loss over 100 days

Monitoring

- Traditionally, we have focused on measuring results (outcomes).
- Focus needs to shift toward monitoring processes:
  - Dry matter intake – pre and post-partum
  - Urine pH
  - Streak marker density
  - DINCU
  - Cow comfort potential
**Cow-side Monitors For Close-up Cows:**

- Urine pH once weekly
- Pen counts/ stocking density and bunkspace
- Ration delivery and lockups within 5-10 min. of feeding
- Attitude and appetite of cows (DMI/ cow/ day)
- Days in close-up pen
- Comfort, cooling, and others:
  - Freestall use index and cow cleanliness scores
  - Manure scores - consistency across group (3 to 3.5 on 1-5 scale)
  - Heat abatement system - soakers, fans, etc

**Cow-side Monitors For Fresh Cows:**

- Pen counts/ stocking density and bunkspace
- Ration delivery and lockups within 5-10 min. of feeding
- Attitude and appetite of cows (DMI/ cow/ day)
- Days in fresh pen
- Comfort, cooling, and others:
  - Freestall use index and cow cleanliness scores
  - Manure scores - consistency within group (as low as 2 but 2.5 to 3 on 1-5 scale)
  - Heat abatement system - soakers, fans, etc
  - Weight swings - all cows should lose weight, but < 0.75 BCS (~ 90 lbs)
  - Lock-up times (< 45 minutes/day for monitoring protocols)

**Nutrition and Feed Delivery Monitors**

<table>
<thead>
<tr>
<th>DMI</th>
<th>Close-ups (21 to Calving)</th>
<th>Fresh Cows (2 to 21 DIM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Lactation</td>
<td>&gt; 23 lbs</td>
<td>&gt; 26 lbs</td>
</tr>
<tr>
<td>Mature Cows</td>
<td>&gt; 26 lbs</td>
<td>&gt; 42 lbs</td>
</tr>
</tbody>
</table>

- Feed dry matter (are you feeding what you think you’re feeding?)
- Particle size - fresh vs. refusals
- Urine pHs - weekly basis on close-up cows
  - Goal - all cows 6.0 to 6.9 (Don’t worry about the “average”)
### Herd-Level Outcome Monitors for Transition Management

- **Disease incidence (weekly/monthly)**
- # with condition / # fresh (at risk) over that time period

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Mean (%)</th>
<th>Range (%)</th>
<th>Goal (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk Fever</td>
<td>8</td>
<td>1 to 44</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Displaced Abomasum</td>
<td>3.3</td>
<td>1 to 14</td>
<td>&lt; 3</td>
</tr>
<tr>
<td>Retained Placenta</td>
<td>10</td>
<td>1 to 36</td>
<td>&lt; 8</td>
</tr>
<tr>
<td>Metritis</td>
<td>12.8</td>
<td>2 to 36</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>Dystocia</td>
<td>13</td>
<td>2 to 36</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>6</td>
<td>1.4 to 11</td>
<td>&lt; 8</td>
</tr>
</tbody>
</table>


### Sample Fresh Cow Data from Western Herd

**Event**

<table>
<thead>
<tr>
<th>Event</th>
<th>Total</th>
<th>8-Jan</th>
<th>8-Feb</th>
<th>8-Mar</th>
<th>8-Apr</th>
<th>8-May</th>
<th>8-Jun</th>
<th>8-Jul</th>
<th>8-Aug</th>
<th>8-Sep</th>
<th>8-Oct</th>
<th>8-Nov</th>
<th>8-Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRESH</td>
<td>763</td>
<td>64</td>
<td>60</td>
<td>53</td>
<td>60</td>
<td>61</td>
<td>54</td>
<td>80</td>
<td>71</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA</td>
<td>37</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MF</td>
<td>62</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RP</td>
<td>53</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### What Has Been The Level Of Stillbirths For Each Lactation Group?

<table>
<thead>
<tr>
<th>Lactation</th>
<th>Fresh Males</th>
<th>Twins</th>
<th>Male Female</th>
<th>Alive</th>
<th>Dead</th>
<th>M-Dead</th>
<th>F-Dead</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8,640</td>
<td>63</td>
<td>30</td>
<td>67</td>
<td>52</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>4804</td>
<td>9</td>
<td>184</td>
<td>2216</td>
<td>1910</td>
<td>46</td>
<td>177</td>
</tr>
<tr>
<td>3</td>
<td>6032</td>
<td>4</td>
<td>209</td>
<td>2381</td>
<td>1590</td>
<td>44</td>
<td>28</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15,448</td>
<td>63</td>
<td>30</td>
<td>67</td>
<td>52</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>

Total: 15,448
What percent of first test milks (DIM=10-40) in first lactation cows are less than 50 lbs (23 kgs)?

What percent of first test milks (DIM=10-40) in mature cows are less than 70 lbs (32 kgs)?

<table>
<thead>
<tr>
<th>Month</th>
<th>PCT</th>
<th>Count</th>
<th>Total</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>0</td>
<td>0</td>
<td>38</td>
<td>0-9</td>
</tr>
<tr>
<td>Feb</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>0-13</td>
</tr>
<tr>
<td>Mar</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>0-17</td>
</tr>
<tr>
<td>Apr</td>
<td>4</td>
<td>1</td>
<td>25</td>
<td>1-20</td>
</tr>
<tr>
<td>May</td>
<td>13</td>
<td>2</td>
<td>15</td>
<td>4-38</td>
</tr>
<tr>
<td>Jun</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>0-15</td>
</tr>
<tr>
<td>Jul</td>
<td>0</td>
<td>0</td>
<td>40</td>
<td>0-30</td>
</tr>
<tr>
<td>Aug</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>0-20</td>
</tr>
<tr>
<td>Sep</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>0-12</td>
</tr>
<tr>
<td>Oct</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0-12</td>
</tr>
<tr>
<td>Nov</td>
<td>7</td>
<td>2</td>
<td>10</td>
<td>0-5</td>
</tr>
<tr>
<td>Dec</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>0-6</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>20</td>
<td>273</td>
<td>5-11</td>
</tr>
</tbody>
</table>

(Percent of 1st lactation cows with first milk < 23 kg)

<table>
<thead>
<tr>
<th>Month</th>
<th>PCT</th>
<th>Count</th>
<th>Total</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>0-18</td>
</tr>
<tr>
<td>Feb</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>0-18</td>
</tr>
<tr>
<td>Mar</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>0-15</td>
</tr>
<tr>
<td>Apr</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>0-13</td>
</tr>
<tr>
<td>May</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>0-17</td>
</tr>
<tr>
<td>Jun</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>0-15</td>
</tr>
<tr>
<td>Jul</td>
<td>0</td>
<td>0</td>
<td>40</td>
<td>0-30</td>
</tr>
<tr>
<td>Aug</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>0-20</td>
</tr>
<tr>
<td>Sep</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>0-12</td>
</tr>
<tr>
<td>Oct</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0-12</td>
</tr>
<tr>
<td>Nov</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>0-13</td>
</tr>
<tr>
<td>Dec</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>0-6</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>10</td>
<td>188</td>
<td>3-10</td>
</tr>
</tbody>
</table>

(Percent of mature cows with first milk < 32 kg)
Other Herd-Level Monitors for Transition Management:  
First Test Fat:Protein Ratio

- Evaluate the ratio of first DHIA test butter fat (%) to protein (%)
- Example: cow 304: fat= 5.1%, protein =2.8% - ratio = 1.8
- On the individual cow, not a very good test
  - Se ~ 65-70%, Sp ~ 55-60%  
  - Better test at herd level
    - Se >80%, Sp ~ 70%
    - Goal - < 40% of cows with 1st test F:P > 1.4 (DIMFT= 10-40 DIM)
    - Average ~ 40% but good herds can get to 25% or less

Se ~ 65-70%, Sp ~ 55-60%
Better test at herd level
Se >80%, Sp ~ 70%
Goal – < 40% of cows with 1st test F:P > 1.4 (DIMFT= 10-40 DIM)
Average ~ 40% but good herds can get to 25% or less

Other Monitoring Approaches for Transition Management

- Prepartum screening of NEFA's
  - Performed on individuals, but really herd screening
- Postpartum BHBA's
  - Performed on individuals, herd screening, but can be used for tx
- Urine/ milk ketone tests
  - Ketostix (read at 5 seconds)
  - Sensitivity = 79%
  - Specificity = 96%
  - (relative to serum BHB > 1400 umol/ L - Carrier et al, 2004)
- Individual milk weights
- Transition cow index (Nordlund et al, 2006)
**NEFA Testing**

- Good estimate of excessive body fat mobilization *prepartum* (before calving)
- Sample Population: Close-up dry cows 2 to 14 days before calving
- Cutoff > 0.4 mmol/Liter
  - (Some are suggesting > 0.5 mmol/Liter)
- Alarm level being suggested is > 10%

*Modern Techniques for Monitoring High Producing Dairy Cows*
*Cook, Oetzel, Nordlund*  *In Practice* October 2006

**Beta-HydroxyButyric Acid (BHBA)**

- Good predictor of negative energy balance *postpartum*
- Serum conc. > 1000 μmol/L = subclinical ketosis
- Serum conc. > 1400 μmol/L = clinical ketosis  *(Duffield, 1997)*
- When choosing a single cutpoint, a BHBA threshold value of 1400 μmol/L (1.4 mmol/L) is recommended
  - Based on the increased risk of displaced abomasum or clinical ketosis above this level

**In Summary - Focus Efforts on a Few Key Areas to Help Improve Transition Success**

- Pen moves
  - Eliminate unnecessary moves
  - Avoid moving during last 10 days prior to calving
- Nutritional management and access
  - Stocking density/bunk space in close-up and fresh pens
  - Ensure adequate DINCU
- Cow comfort
  - Maintain adequate, comfortable, dry area for resting
  - Avoid prolonged, idle standing times
- Develop a careful, consistent monitoring approach to help detect change and redirect efforts
Thanks For Your Attention!

Questions?
moverton@uga.edu