Animal Behavior and Environmental Considerations: Cow needs at calving vs. what she gets

Audience Participation

- Each dairy should have 1 ‘clicker’
- Do not touch until instructed
- Do not turn on/off
- Just select the letter (A, B, C, etc)
- Answer quickly please
- Responses are anonymous
The Transition Period

- What does the cow need in the close-up pen?
- What does the cow need at calving?

Outline

- Lying time
- Stall dimensions and stall base
- Stocking density
- Heat abatement
- Grouping strategies and pen moves
- Calving
- What she is getting...
Lying Time for Lactating Cows

- High priority behavior (Munksgaard et al., 2005)
- Motivated to lie down ~12 h/d (Jensen et al., 2005)
- Lie down for 11-12 h/d on average (von Keyserlingk et al., 2012)
- Lying/standing behavior linked to lameness (Cook and Nordlund, 2009) and production (Grant, 2007)

What about lying behavior in transition pens?

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Lying Time During Transition Period

(Calderon and Cook, 2011)
Transition lying behavior and sole lesions

- Hooves scored for lesions at wks -2, and +3, 7, 11, 15
- Severe lesions in wks 7-15 vs. cows with no lesions

\[ \times \text{wk } -2 = 2 \text{ hr diff} \]
\[ \times 24 \text{ h } = 4 \text{ hr diff} \]

(Proudfoot et al., 2010)

Transition lying behavior and sole lesions

- Cows with lesions in mid-lactation spent more time perching 2 wks pre-fresh

(Proudfoot et al., 2010)
Transition lying behavior and ketosis

- Clinically ketotic cows had higher standing times the week before and on the day of calving

![Graph showing standing time](image)

Grey = Non-ketotic
Black = Clinically ketotic

(Itle et al., 2015)

What Affects Lying Time?
Stall Design and Dimensions

Stall Width – What are your cows getting in the close-up pen?

A. < 48 inches
B. 48 inches
C. 50 inches
D. > 50 inches
## Stall Design and Dimensions

<table>
<thead>
<tr>
<th>Stall Dimension (inches)</th>
<th>Body Weight Estimate (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1000</td>
</tr>
<tr>
<td>Total stall length facing a wall (A)</td>
<td>96</td>
</tr>
<tr>
<td>Outside curb to outside curb distance for head-to-head platform (B)</td>
<td>192</td>
</tr>
<tr>
<td>Distance from rear curb to rear of brisket locator (C)</td>
<td>64</td>
</tr>
<tr>
<td>Center-to-center stall divider placement (Stall width) (D)</td>
<td>42</td>
</tr>
<tr>
<td>Height of brisket locator above top of curb (loose bedded stall) or mat/mattress surface (E)</td>
<td>3</td>
</tr>
<tr>
<td>Height of upper edge of bottom stall divider rail above top of curb (loose bedded stall) or mat/mattress surface (F)</td>
<td>10</td>
</tr>
<tr>
<td>Height of neck rail above top of curb (loose bedded stall) or mat/mattress surface (G)</td>
<td>42</td>
</tr>
<tr>
<td>Interior diameter of the stall divider loop (H)</td>
<td>30</td>
</tr>
<tr>
<td>Horizontal distance between rear edge of neck rail and rear edge of curb for mattress stalls (I)</td>
<td>64</td>
</tr>
<tr>
<td>Horizontal distance between rear edge of neck rail and rear edge of curb for deep loose bedded stalls (J)</td>
<td>58</td>
</tr>
</tbody>
</table>

*Note: Curbs wider than 6 to 8 inches are not recommended.*

### Stall Base – What are your cows getting in the close-up pen?

- A. Mattress
- B. Rubber mat
- C. Waterbed
- D. Deep-bed
- E. Bedded-pack
- F. Other
Close-up Pen – What are cows getting?

Hoard’s Dairyman webinar poll

What is your prefresh cow resting surface?

Poll Results:

- Open lot shade, scraped only: 10%
- Open lot shade, scraped and bedded: 12%
- Bedded pack: 36%
- Freestall or tiestall, sand: 32%
- Freestall or tiestall, mattress: 10%

Types of Stall Base for High Cows

(Chapter 45, Novus C.O.W.S. data)
Stall Base Affects Lying Time

- Lying time higher on sand pack vs. sand stalls (Fregonesi et al., 2009)
- Lying time 0.8 h/d higher on deep-beds vs. other stall bases (Ito et al., 2014)
- Deep-beds > mattress > concrete (Wagner-Storch et al., 2003)
- Higher lying time on sand+straw vs. concrete or mattresses with straw 1 day pre-calving (Campler et al., 2014)

Additional Benefits of Deep-beds

- Higher lying time for lame cows (Ito et al., 2010)
- Lower overall and severe lameness prevalence
  - 17.1 vs. 27.9% (Espejo et al., 2006)
  - 11.1 vs. 24.0% (Cook et al., 2004)
  - 29.3 vs. 39.2% (Novus C.O.W.S® Northeast benchmark data, 2015)
- Fewer and less severe hock injuries
  - 18.4 vs. 51.5% (Novus C.O.W.S® Northeast benchmark data, 2015)
Stocking Density

A. The most expensive thing on a dairy is an empty stall

B. The most expensive thing on a dairy is a crowded close-up pen

Close-up Pen Stall Stocking Density – What are cows getting?

A. < 100%
B. 100%
C. 101 – 105%
D. 106 – 110%
E. > 110%
What are cows getting?

Hoard’s Dairyman webinar poll

What is your pen/stall configuration?

Poll Results:

- 3-row pen, more than 1.0 cows per stall: 13%
- 3-row pen, limited to 1.0 cows per stall: 17%
- 2-row pen, more than 1.0 cows per stall: 15%
- 2-row pen, limited to 1.0 cows per stall: 29%
- Open lot, more than 1.0 cows per headlock: 27%

(Dr. Ken Nordlund, 2015)

Rows of Stalls in High Pen

[Bar chart showing percentages for 2-row pen, 3-row pen, and other, by Benchmark Region (NE, MW, CA, Canada).] (Novus C.O.W.S. data)
Stocking Density at the Stalls

- Recommended: $\leq 100\%$ stall stocking density
- Ideal: 80\% stall stocking density
- Build pre- and post-fresh pens for 140\% of the average number of calvings
  - 10 calvings/week
  - 3 weeks in close-up pen
  - $10 \times 3 = 30$ stalls $\times 140\% = 42$ stalls

(Dairyland Initiative)

Stocking Density on a Bedded-Pack

Recommended:
- at least 100 sq. ft./cow bedded space
- 120-150 sq. ft./cow including feed alley space

(Dairyland Initiative)
Overstocking at the Stalls in Lactating Pen

- Reduced lying time (Fregonesi et al., 2007)
- Reduced production (Bach et al., 2008)
- Reduced milk fat % (Hill et al., 2006; Sova et al., 2013)
- Compromised reproduction (Schefers et al., 2010)

Overstocking at the Stalls in Pre-Fresh Pen

- Milk prod. reduced when stocking density increased from 80 to 120% (unpublished data, Gary Oetzel, U of WI)
  - biggest effect on heifers
    - 500+ lbs greater prod. in first 80 DIM
    - each 10% increase above 80% = 1.6 lb/d decreased milk
- Overcrowding on a bedded-pack can lead to dirtier cows and increased SCC (Kentucky extension)
Close-up Pen Stall Feed Bunk Space – What are cows getting?

A. < 24 inches  
B. 24 – 29 inches  
C. 30 inches  
D. > 30 inches

Stocking Density at the Feed Bunk

- 30 inches/cow of bunk space for 21 d before calving and 21 d after calving
- Stock 24 inch headlocks at only 80%
- More crossovers (every 12 to 15 stall widths) to increase feed bunk (and water) space
Overstocking at the Feed Bunk in Lactating Pen

- Increased competition (Collings et al., 2011)
- Increased feeding rate (Hosseinkhani et al., 2008)
- Reduced DMI in heifers (Grant et al., 2010)
- Reduced milk fat % (Hill et al., 2006; Sova et al., 2013)
- Increased SCC (Sova et al., 2013)
- Compromised reproduction (Caraviello et al., 2006)

Overstocking at the Feed Bunk in Pre-Fresh Pen

- Increased competition (Proudfoot et al., 2009)
- Reduced DMI when stocked above 85% (unpublished data, Ken Buelow, eXtension.org)
- ≤12 inches bunk space, or 12-24 inches combined with limited feed availability, was associated with increased risk of DA (Cameron et al., 1998)
Headlocks can Reduce Competition

(Huzzey et al., 2006)

Don’t Forget about Water!

- ≥3-3.5 in/cow linear water space (Dairyland Initiative)
- >1 water trough per pen
- 2 lbs/d/cow more milk for every 1 inch additional linear water space/cow in lactating pens \( P=0.08 \), Sova et al., 2013)
Novus C.O.W.S. Program® Water Case Study

- pre-fresh heifer pen
- bedded pack with 1 small water near pack
- water space increased and trough moved to feed bunk

- **DMI increased by 8% in 3 d**

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**Heat Abatement in Close-up Pen – What are cows getting?**

A. Nothing
B. Fans
C. Sprinklers
D. Fans and sprinklers
Heat Abatement

Order of priority for fans and sprinklers (Elanco):
- Holding area
- Maternity pen
- Close-up pen
- Lactating pens
- Hospital pen
- Processing areas (palpation rail, sort area, etc...)
- Shade for open lots (≥48 sq. ft./cow)

Benefits of Sprinklers and Fans in Close-up Pen

- Reduced standing time
  - 474 vs. 390 min/d
- Increased rumination time
  - 243 vs. 283 min/d
- Increased DMI prepartum
  - 13.7 vs. 15.5 kg/d
- Increased feed efficiency
  - 2.06 vs. 2.22 FCM/DMI
- Increased milk production
  - 40.5 vs. 44.6 kg/d

(Tom Bailey, Elanco)

(Karimi et al., 2015)
Greater Production with Heat Abatement in Close-up Pen

(Karimi et al., 2015)

Grouping Strategy in Transition Period – What are cows getting?

Heifers and Mature Cows:

A. Always separate
B. Separate for close-up
C. Separate for fresh
D. Always together

(Karimi et al., 2015)
Heifers and Mature Cows – Separate or Together?

- Heifers most negatively impacted by overcrowding and competition
- Keep heifers and cows separate in pre-fresh, maternity and fresh pens when possible

If co-mingled:
- Design stalls to comfortably fit all cows in pen
- Don’t overcrowd

Pen Moves in the Transition Period

-21d Close-up  -2 to 3d Maternity  Calve  0 to 2d Fresh  +14 to 21d High
**Pen Moves to Close-up Pen – What are cows getting?**

A. > 21 days  
B. 21 d  
C. 14-20 d  
D. < 14 d

Impacts of Regrouping

- Effects seen for 1-3 days after regrouping

Cows that were moved:
- decreased production
- decreased DMI
- increased competitive interactions initiated

Both cows that moved and cows already in the pen:
- decreased rumination time
- increased feeding rate

(von Keyserlingk et al., 2008; Schirmann et al., 2011)
Pen Move Frequency

- All-in-all-out (AIAO)
- Weekly pen moves
- Daily pen moves

AIAO pens or weekly moves are preferred to daily moves
  - Reduces social stress and impacts of regrouping

AIAO vs. weekly
  - Fewer competitive displacements at feed bunk with AIAO (Lobeck-Luchterhand et al., 2014)
  - No differences in health, reproduction, or production (Silva et al., 2013)

Reducing the Negative Effects of Pen Moves

- No overstocking at stalls or feed bunk
- Move later in the day (not at peak feeding times)
- Move cows with a companion
- No pen moves in last 7 d before calving (except to a maternity pen)
Pen Moves to Calving Pen – What are cows getting?

A. > 2 days
B. 12- 48 hrs
C. Signs of calving
D. Calve in close-up pen

“Just-In-Time” Calving

- Cow moved to calving pen during Stage II labor, when calf legs are visible

**PROS**
- Cows spend less time alone in the calving pen
- Need fewer calving pens
- Keeps calving pen cleaner

**CONS**
- Labor intensive – somebody needs to catch these cows at the right stage and move them
- If missed, cows will calve in pen
- Calving pen should be close to close-up pen
When to Move a Cow to Calving Pen?

(Proudfoot et al., 2013)

Lying Time Pre-calving Affected

(Proudfoot et al., 2013)
Length of Stage II Labor Affected

![Graph showing the length of stage II labor with different stages and their implications.](Image)

(Proudfoot et al., 2013)

When to Move a Cow to Calving Pen?

- **“Just in time”** (Stage II – when feet are showing)
- **Not too early**
  - 1-3 d in maternity pen at most
  - when > 3 d, higher NEFA’s (anecdotal evidence Cook and Nordlund, 2004) and greater risk of ketosis and DA (Gary Otezel, WI)
- **Not too late in Stage I**
  - disrupt labor and prolong Stage II which is associated with dystocia (Proudfoot et al., 2013; Schuenemann et al., 2011)
  - maybe wait until Stage II and do “just-in-time”
- **No more than 12-48 hr before calving**
The Calving Pen

- **12 x 12 ft or 140-200 sq. ft./cow**
  (Dairyland Initiative and Penn State Extension)
- **Headlock and/or gate to facilitate handling**
- **Clean and dry bedding**
  - Higher lying time on sand+straw vs. concrete or mattresses with straw 1 day pre-calving (Campler et al., 2014)

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- **Seclusion?**
What Does the Cow Want at Calving?

(Proudfoot et al., 2014)
What Does the Cow Want at Calving?

(Proudfoot et al., 2014)

![Bar chart showing the number of cows in shelter and open locations during day and night.](chart.png)

What Does the Cow Want at Calving?

(Proudfoot et al., 2014)

![Calving location image with cows in a barn.](image.png)
What Does the Cow Want at Calving?

(Proudfoot et al., 2014)

What Does the Cow Want at Calving?

(Proudfoot et al., 2014)
Summary

- In the close-up and calving pens provide:
  - large, well-bedded lying surface
  - low feed bunk and water stocking density
- Implement heat abatement in close-up, maternity, and fresh pens
- Keep heifers and mature cows separate if possible
- Limit pen moves 7 d before calving
- Move cows to maternity pen “just-in-time” or no more than 12-48 hr before calving
- Offer some seclusion at calving
Thank you

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