Calving Management and Training
Maternity Personnel

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Front or Rear Leg?

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Frequency of Dystocia

Degree of Difficulty at Calving

~30%

First-Calf Heifers
Multiparous Cows

Severe Dystocia: 6.8%
Mild Dystocia: 11.8%
No Dystocia, but Assisted Anyway: 12.4%
No Assistance: 79.4%

(USDA. 2010. USDA:APHIS:VS, CEAH. Fort Collins, CO.)

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Prevalence of Calving-Related Events

Goal: <2%

Metritis: 18% (6-39)
RFM: 7.8% (5-15)
Pregnancy Loss: 12% (8-28)
Stillbirth: 8.1% (4-22)
MF: 4.9% (3-8)
DA: 3.8% (1-6)
Ketosis: 4% (3-6)

(USDA 2009; Schuenemann et al., 2011, JDS 94:5494-501; Brick et al., 2012, JDS 95:1894-1905; Santos et al., 2010, RDA VII:387-404; Santos et al., 2004, ARS 82:513-535)
Calving Management Program: 
↓Stillbirth and ↑Calf Development

1) Calving & colostrum protocols

2) Management (nutrition & reproduction):
   - Replacements: birth-weaning-breeding-calving
   - Dry cows: BCS, hypocalcemia, days dry

3) Training/re-training & regular meetings

4) Records:
   - Leading Indicators:
     diet, facility/comfort, sire, people, breeding program, water quality, schedule, expected calving date, parity, age at calving
   - +/- Indicators:
     BCS, hypocalcemia, gender, shift change, calf presentation, twins
   - Lagging Indicators:
     dystocia, stillbirth, calving time

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Implementing a Transition Cow Program

1. Dry-Off: ~230 days of gestation
   - Grouping and BCS
   - Control of mastitis
   - Hoof trimming
   - Vaccination
   - Prepartum diets
   - ↓metabolic disorders

2. Close-Up: ~255 days of gestation
   - Cow move based on days pregnant:
   - Grouping and BCS
   - Vaccination
   - Prepartum diets
   - ↓metabolic disorders

3. Calving: Cow move to maternity
   - Training personnel
   - ↓calving-related losses

Resting time (h/d; comfort)
- Avoid drop in DMI
- Ketosis/Hypo_Ca

Water Quality:
- Cations: Na, K
- Anions: S, Cl

DCAD

30 60 90 DIM

Milk

Breeding

Lactation groups

Fresh

Close-Up

Far-Off

-60 d  -21 d

Calf

Replacements

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Definition of Stillbirth

Calf born dead or died within 24 hours after birth (normal gestation length)
Calving Management

- Equipment/resources for the task (protocols)
- Know **what to expect** (what to look for and why is that important)
- Know **what to do** (knowledge and skills)
- Know the **leading** risk factors
- ...

Determine the Prevalence of **Stillbirth**
Prepartum Cow “COMFORT” Increases the Prevalence of Stillbirth

- Monitor “lying time” (h/d) to determine:
  - Potential problems with dry matter intake
  - Negative energy balance
  - Increased “standing” time is associated with lameness
  - ...

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IceQube
Cows Have a Strong Behavioral Need to Rest (Lying Time; h/d)

- For every 3 minutes of lost rest, cows sacrifice 1 minute of “DM intake”
- Example “pre- and postpartum cows”:
  - Resting ↓2 h/d – DM intake ↓40 min/d (~2 kg)

- Factors associated with Lying Time:
  - Bedding surface
  - Milking frequency
  - Stocking density
  - Grouping (cows and heifers) pre- and postpartum
  - ...

(Metz, 1985; Hopster et al., 2002; Munsgaard et al., 2005; Cooper et al., 2007; Schuenemann et al., 2016)

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Dairy A:
Lying Time (h/d) for Pre-Partum Cows and Heifers

(Schuenemann et al., 2016; on-going study)

The red rectangle shows the expected range of hour per day of lying time
Dairy B:
Lying Time (h/d) for Pre-Partum Cows and Heifers

(Schuenemann et al., 2016; on-going study)

The red rectangle shows the expected range of hour per day of lying time.
Stillbirth Decreases 1.3 Percentage Points for Every Hour of Additional Lying Time

Lying time (h/d) of prepartum cows (20 to 10 d prior to calving) were correlated with the annual prevalence of stillbirth (%) of 14 dairy herds in Ohio.

\[ y = -1.3157x + 22.099 \]
\[ R^2 = 0.6531 \]
For Free-stall Barns, How Do I Estimate the Size of My Pre-Partum Pen?

- **Average**: 38 births per week
- **Range**: 6-54 (or 16% - 142% of weekly average)
- **Guideline**: to avoid overstocking, plan for 162 stalls for the close-up period based on max average (140%) births per week (54 births/wk * 3 wks = 162 stalls)
Management of Pre-Partum Cows

- Assumption: “calving date” is known
- If “no-calving dates” (bull bred heifers or cows; unknown pregnancy status) or missing records:
  - Likely to “overstock” pre-partum pens
  - ↓ DM Intake, ↑ NEFA (primarily heifers)
  - ↑ calving difficulty (↓ glucose)
  - ↑ ketosis in early lactation

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Does the Pattern of Previous Dry Period Lengths Match the Management Plan?

- 74% of Cows >70 days
- 6% Cows <55 days
- 55% of Cows >70 days
- ↑NEFA Pre-partum and ↑Ketosis Post-partum
Why is Important the **Energy and Calcium Status** at Calving?

**Parturition:**
- Calcium
- Energy (↑Glucose)

- BHBA (ketosis)
- Liver
- NEFA
- FAT

Pre-partum diets (DCAD)
Feed Bunk Management
DM Intake

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10 L of Colostrum: 11 Mcal of energy, 140 g of protein, 23 g of calcium, 9 g of phosphorus, and 1 g of magnesium

(Coff and Horst, 1997 JDS 80:1260–1268; Kehoe et al., 2007 JDS 90:4108-4116; Tsioulpas et al., 2007 JDS 90:5012-5017)

Calcium loss in Colostrum is 10-15x Higher than in Blood (~4 g)
Normal Calf Delivery

Estimated values:
- Forward or Anterior = 96%
- Backward or Posterior = 4%
- Multiple calves = 5%
- Breech = 1%

(Hunter et al., 2013 JDS 96:383)
Effect of Parity on Stillbirth

- 1 dairy herd; 3,870 births

(Hunter et al., 2013; JDS 96:383)

(a,b) P < 0.05

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Backward Presentation

- 1 dairy herd; 3,870 births

(Hunter et al., 2013; JDS 96:383)

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Effect of Calving Ease on Stillbirth

- 1 dairy herd; 3,870 births

(Hunter et al., 2013; JDS 96:383)

- Twins
- Male calf

Stillbirth (%)

Calving Ease

1 2 3 4

(n=3,308) (n=254) (n=180) (n=128)

(a,bP < 0.05)
Effect of Communication at the Time of Personnel Shift Change on Stillbirth

(1 h before and 1 h after of shift change; 12 h/shift)

(Hunter et al., 2013; JDS 96:383)

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Monitor Calving Progress
(evident every 15-20 minutes)

- Appearance of the “water bag”
- Cow is sniffing the newborn calf
- Showing feet/nose of the calf
- Birth is completed

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### Signs of Normal Births

<table>
<thead>
<tr>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance of the AS or feet of the calf outside the vulva</td>
<td>Noakes et al., 2001 Schuenemann et al., 2011</td>
</tr>
<tr>
<td>Signs of calving progress</td>
<td>Schuenemann et al., 2011</td>
</tr>
<tr>
<td>Mean time since the appearance of the AS outside the vulva to birth</td>
<td>Noakes et al., 2001 Schuenemann et al., 2011</td>
</tr>
<tr>
<td>Mean time since the appearance of the feet of the calf outside the vulva</td>
<td>Schuenemann et al., 2011</td>
</tr>
<tr>
<td>Time that a cow or first-calf heifer is in labor (abdominal contractions)</td>
<td>Gundelach et al., 2009 Schuenemann et al., 2011</td>
</tr>
<tr>
<td>Frequency of observation</td>
<td>Schuenemann et al., 2011</td>
</tr>
</tbody>
</table>

(*) The mean times were estimated using the mean + 2 SD (standard deviation)
Risk Factors Associated with Stillbirth

- **Season (winter-spring)** (Lombard et al., 2007; JDS 90:1751–1760)
  - Calving rate (# of births per unit of time)
    (Schuenemann et al., 2013; JDS 96:2671-2680.; Hunter et al., JDS 96:383)

- **Heat Stress** – ↓ DMI and calcium balance

- **Managing groups of cows/first-calf heifers**

- **Cow move and obstetric intervention**
  (Villettaz Robichaud et al., 2013; Proudfoot et al., 2013)
Guidelines for Assisted Births

Parturition Begins

Normal Birth

No Calving Progress

Normal presentation, position, and posture

Abnormal presentation, position, and posture

Correction

Guidelines for Assisted Extraction

Extraction Possible

Calf Alive/Dead

Assisted Extraction

No Progress within 30 min

Extraction Not Possible

Calf Alive/Dead

Call Your Veterinarian

OBSERVATION

INTERVENTION

DECISIONS

(Adapted from Schuijt and Ball, 1980)

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How to Build & Monitor Effective Teams?

Establish SOPs

Hands-on Training

Knowledge
Skills

Performance
Re-Assign Tasks
Regular Meeting Feedback

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How Hard to Pull?

Nerve damage due to excessive use of force!

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Effect of Calving Training on Personnel Knowledge

- 18,000 cows
- 18 herds
- 70 workers

(Schuenemann et al., 2013 JDS 96:2671-2680)

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(Schuenemann et al., 2011; JDS 94:483)
MOBILE BIRTH MONITORING
INCREASE LIVE BIRTHS & FARM PROFITABILITY
DIRECT TO YOUR PHONE
Daily EVENTS at individual level produce dynamic (over time) information at herd level

http://www.ecalving.com

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Assessment of an application for touchscreen devices to record calving-related events in dairy herds and monitor personnel performance

A. A. Barragan, J. D. Workman, S. Bas, K. L. Proudfoot, and G. M. Schuenemann
Department of Veterinary Preventive Medicine, The Ohio State University, Columbus 43210

Personnel: $P < 0.05$
Herd: $P < 0.05$
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Personnel: $P < 0.05$
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5 Large Dairy Herds (800-10,000 cows)
Milk is 87% Water ...

Does the Diet Matter?
**Example: Cation-Anion Balance with Same Water and Two Different Diets**

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Water, mg/L</th>
<th>Diet, %</th>
<th>DCAD (mEq/100g DM)</th>
<th>Goal (mEq/100g DM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRY Cow Diet</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Na</td>
<td>99</td>
<td>0.25</td>
<td>-53.04</td>
<td>-15 to -20</td>
</tr>
<tr>
<td>K</td>
<td>6.47</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>1514</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>33</td>
<td>1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FRESH Cow Diet</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Na</td>
<td>99</td>
<td>0.42</td>
<td>-0.67</td>
<td>+20 to +40</td>
</tr>
<tr>
<td>K</td>
<td>6.47</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>1514</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cl</td>
<td>33</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Potential Calving-Related Problems

• ↑ calcium loss in pre-fresh cows
• ↓ DM Intake
• ↑ Negative Energy Balance
• ↑ Ketosis and diseases (e.g., Metritis)
• Performance: ↓ Milk and ↓ Reproduction
• ...
Management of Maternity Pen

Prefresh: Free-stall barns (cow move \(\rightarrow\) “water bag”)

Parturition: \(\sim20\ m^2\) for 24 h and colostrum harvested within 3 h

Fresh: after 24 h cows are moved into free-stall barns (by parity)
Management of Maternity Pen

Mark High Risk Cows: Dystocia “D”, “RF”, and Birth of Twins “T”

Clip Tail (all cows) and oral calcium (Lact ≥3; Drench or Bolus; 75 g Ca)

Take care of calf (colostrum)
Key Factors Influencing Passive Transfer

- **Quality**
  - >50 mg/mL IgG (50 g/L)
- **Quantity**
  - At least 4 L
- **Timing**
  - 4 L within 3 hours
- **Clean and sanitation**
  - Minimal bacterial load
## Monitoring Colostrum Quality

### Evaluation of a Brix refractometer to estimate serum immunoglobulin G concentration in neonatal dairy calves

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†Department of Veterinary Microbiology, Western College of Veterinary Medicine, University of Saskatchewan, Canada S7N 5B4
‡The Saskatoon Colostrum Co. Ltd., Saskatoon, Saskatchewan, Canada

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Brix (%)</th>
<th>IgG</th>
<th>Reading at</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colostrum</td>
<td>≥22</td>
<td>≥50 g/L</td>
<td>68 °F/20 °C</td>
</tr>
<tr>
<td>STP</td>
<td>≥8.4</td>
<td>≥5.5 g/dL</td>
<td>(Sample &amp; Instrument)</td>
</tr>
</tbody>
</table>
Risk Factors for Lifetime Performance of Replacements:

- Each unit of calving difficulty: \(-195\) kg \((P=0.05)\)
- Weaning age: \(-463\) kg \((P=0.02)\)
- Days ill: \(-126\) kg \((P<0.01)\)
- Wean DMI (for every 1 kg DM): \(+286\) kg \((P=0.02)\)
High Risk Scenario: Have very Motivated Workers, BUT without “K” and “S”

Worker Performance

\[ P = (K + S) \times A \]

- Knowledge
- Skills
- Attitude
THANK YOU!