Colostrum Management

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COLOSTRUM

• Sets the calf up for a lifetime
  • Calf health
  • Calf growth rates
  • Local gut effects
  • Lifetime health
  • Future milk production
  • Longevity
Colostrum Management

• 3 Q’s
  • Quantity
    • MINIMUM 4 litres
    • Or 10% of body weight
  • Quickness
    • ASAP
  • Quality
    • >50 mg IgG/ litre
    • < 100,000 cfu/mL
Quantity & Quickness

- First feeding
  - ASAP after birth (within 3 hours)
  - Minimum 4 quarts or 10% of BW
    - DO NOT skimp on color breeds or small calves

- Second feeding 6 to 12 hours later
  - 2 to 4 quarts colostrum
Quality & Quickness

What about feeding colostrum after 24 hours of age?

• Minimal if any IgG absorption

• BUT...
  • Many nutrients are available at a higher concentration as compared to milk
  • Maternal cells are still present
  • Coats gut wall
  • Improves gut health
  • Many unknown benefits
Quality & Quickness

How should I feed my calves colostrum?

• Bottle or Esophageal feeder
  • Get the colostrum in the calf ASAP
  • Do what works best for your system

• DO NOT allow the calf to nurse
  • Don’t know how much the calf consumed...if any.
  • Introduction of bacteria into the calf
Colostrum Quality

Many factors can impact colostrum quality and these can occur during one of 4 time points.
Colostrum Quality

1. Pre-partum
2. Harvest
3. Storage
4. Feeding
Colostrum Quality & Composition

**GOOD**
- Nutrients
  - Fat, protein...
- Antibodies
  - IgG
- Maternal Cells

**BAD**
- Bacteria
- Somatic Cell Count
## Colostrum Composition

Overall sample means for IgG, nutrients & bacterial contamination.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>SD¹</th>
<th>Minimum</th>
<th>Maximum</th>
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</thead>
<tbody>
<tr>
<td>IgG (mg/mL)</td>
<td>827</td>
<td>68.8</td>
<td>32.9</td>
<td>&lt;1.8</td>
<td>200.2</td>
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<tr>
<td>Fat (%)</td>
<td>531</td>
<td>5.6</td>
<td>3.2</td>
<td>1.0</td>
<td>21.7</td>
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<tr>
<td>Protein (%)</td>
<td>542</td>
<td>12.7</td>
<td>3.3</td>
<td>2.6</td>
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<tr>
<td>Lactose (%)</td>
<td>538</td>
<td>2.9</td>
<td>0.5</td>
<td>1.2</td>
<td>4.6</td>
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<tr>
<td>Other Solids (%)</td>
<td>544</td>
<td>4.3</td>
<td>0.5</td>
<td>1.1</td>
<td>8.8</td>
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<tr>
<td>Total Solids (%)</td>
<td>496</td>
<td>22.6</td>
<td>4.7</td>
<td>1.7</td>
<td>33.1</td>
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<tr>
<td>SCC Log₁₀</td>
<td>548</td>
<td>5.9</td>
<td>0.8</td>
<td>3.8</td>
<td>7.3</td>
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<tr>
<td>TPC Log₁₀</td>
<td>548</td>
<td>4.9</td>
<td>0.9</td>
<td>3.0</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Morrill et al., 2012
Distribution of IgG concentration

Morrill et al., 2012
Pre-partum

Are we setting our cows up to produce the best quality colostrum?
Best Management Practices: Pre-partum

• Cow health
  • Identify sick & treated cows
  • Discard colostrum from known disease carriers

• Dry cow nutrition
  • Adequate nutrition is needed for fetal development & colostrogenesis

• Vaccination program
  • Improved antibody profile in colostrum

• Cow comfort
How can we evaluate colostrum IgG concentration?
### Methods to Evaluate Colostrum Quality On-Farm

<table>
<thead>
<tr>
<th>Primary method</th>
<th>% Operations</th>
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<tr>
<td></td>
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<tr>
<td>Colostrometer</td>
<td>43.7</td>
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<tr>
<td>Appearance</td>
<td>41.6</td>
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<tr>
<td>Volume of first milking (lbs)</td>
<td>9.7</td>
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<tr>
<td>Refractometer</td>
<td>-</td>
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<tr>
<td>Other</td>
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</table>

Overall, only 53% of operations evaluated colostrum quality

USDA, NAHMS, 2007 and 2014

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Visual Assessment

• Can be subjective to IgG quality

However...

• Detect colostrum that should be discarded
  • Mastitis
  • Bloody
  • Watery
  • Contaminated

• Visual assessment of the cow
Colostrometer

- Based on specific gravity
- Provide an estimate of relative quality, not actual IgG quantity
- Often inaccurate or utilized improperly
- Inexpensive
Refractometer

- Reflects light from protein molecules.

- Not a quantitative test
  - 21% Brix recommended as break-point
    - Above 21% = EXCELLENT
    - 18 – 21% = OK colostrum (might need a supplement or use for second+ feeding
    - <18% = Discard
What about nutrients & bacteria ??
Nutrients & Bacteria

- No cow-side test
- Can send a sample to Dairy One or QMPS
  - Takes times

- Need to be proactive
  - Nutrients – How did we treat the cow during her dry period
  - Bacteria – Primarily harvest to feeding
Colostrum Management

Pre-partum

↓

Harvest

↓

Storage

↓

Feeding

TPC Goal < 100,000 cfu/ml

Range 0 – 60,000 cfu/mL

Actual TPC < 1,000 to > 6 million cfu/mL

Morrill et al, 2012; Stewart et al, 2005.
First one there is the winner!

It’s a race between bacteria
and
The antibodies in colostrum
Consequences of bacterial contamination

- Pathogens may cause disease
  - *E. Coli*
  - *Salmonella*
  - *Mycoplasma*
  - *M. avium subsp. Paratuberculosis*

- Bacteria counts are associated with decreased serum IgG concentrations.

James et al., 1981, Johnson et al., 2007
Reducing The Risk Of Contamination

1. Where does the bacteria come from?

2. What can I do to prevent/reduce bacterial contamination?
Where Does Bacteria Come From?

- **Dry Period**
  - Infected gland
  - Fecal contamination

- **Dirty equipment**
  - Milking equipment
  - Buckets, bottles, esophageal feeders
  - Place of storage

- **During storage**
  - Additional contamination
  - Bacterial Growth

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Best management practices: Pre-partum

- Maintain clean and dry facilities
- Dry-off treatment
- Teat sealants
- Vaccination program
- Nutrition
- Identify infected cows
- Don’t let calf suckle
Best Management Practices: Harvest

- Cow’s teats should be thoroughly cleaned and dried
  - First time in 30-60 days

- All equipment should be well-cleaned and sanitized
  - Milking equipment
  - Buckets

- Don’t pool raw colostrum

- Discard colostrum that is bloody, watery or has fecal contamination
Best Management Practices: Storage

- Storage/feeding equipment should be well sanitized
  - Buckets, bottles, nipples, feeders…
- Cover colostrum after collection to prevent additional contamination
- Colostrum should be fed or cooled within 1 h after collection
  - Freeze excess colostrum in flat gallon zip lock bags
How do we Evaluate colostrum management?
How do we Evaluate colostrum management?

- Review records:
  - Calf Health
  - Calf Mortality
- Evaluate passive transfer rates
Passive Transfer

- Serum IgG
  > 10 mg/mL at 24 to 48 hours of age

- Refractometer (digital or optical)
  > 5.5 gm/dL using TOTAL PROTEIN
  > 7.8 %Brix
  At 24 to 48 hours of age!

Industry Standard > 85% of calves should achieve adequate passive transfer on dairy farms.
Colostrum Management Goals

- Colostrometer = in the green
- Refractometer $\geq$ 21% Brix
- Total plate count $< 100,000 \text{ cfu/mL}$
- Total coliform count $< 10,000 \text{ cfu/mL}$
- Time to first colostrum feeding $< 2 \text{ hours}$
- Quantity $\geq 4 \text{ q or } 10\% \text{ of body weight}$
  - DO NOT SKIMP ON JERSEY CALVES!

- Storage – Feed (or properly store) within 1 hour of collection
- $> 85\%$ of calves should achieve passive transfer

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