Dairy Calf Overview

**Heifer calves**
- Become replacements for the dairy
- Raised on the dairy or at a calf ranch
  - Return to the dairy at 4 months to 20 months old
  - Large dairies often send heifers to calf ranch

**Bull calves**
- 3 uses for dairy bull calves:
  - Fed beef
    - Sold to calf ranches
    - Raised to 4 months
    - Sold to feedlots
  - Dairy bulls
  - Veal calves

Major risks to health and welfare of neonatal dairy calves on dairies and calf ranches

- Birth
- Calves often get wet/dirty in calving area
- Many bull calves are not fed colostrum
  - 48 hours of energy reserves at birth
  - May not be fed until day after birth
  - Dairy must feed calves at dairy at least every 12 hours
- Calves from multiple dairies are on same truck
  - All calves in truck exposed to all maternity areas
  - Overcrowding can increase stress and injuries
- Calves may be frightened during transport and handling
Parturition

• Cortisol and glucose levels increased in both dam and calf
• Dystocia results in calves with:
  – lower Apgar scores
  – respiratory and metabolic acidosis
  – Return to normal in 60 min

Combination of stress and pain could be the reason for the high plasma cortisol concentrations during expulsion.


Cortisol response during calving

"...hormonal changes during labor are related to the phase of labor and the degree of difficulty encountered. Hormonal peaks were reached around the time of expulsion, indicating that they were associated with muscle work, stress and pain rather than metabolic effects."

Behavior after parturition

- Dam licks calf
  - Cleans nose, dries hair
  - Stimulates neuromuscular system of calf
  - Gets calf to stand and nurse
  - Important to cow and calf

At the Dairy

- Calves MUST have colostrum
  - Including bull calves
- Colostrum has
  - ↑ Energy (fat)
  - ↑ Protein
  - ↑ Antibodies

Composition of Colostrum: Transitional Milk and Whole Milk

<table>
<thead>
<tr>
<th>Milking Number (2X)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colostrum</td>
<td>23.9</td>
<td>17.9</td>
<td>14.1</td>
<td>13.9</td>
<td>13.6</td>
<td>12.9</td>
</tr>
<tr>
<td>Transitional Milk</td>
<td>14.0</td>
<td>8.4</td>
<td>5.1</td>
<td>4.2</td>
<td>4.1</td>
<td>3.5</td>
</tr>
<tr>
<td>Whole Milk</td>
<td>4.8</td>
<td>4.3</td>
<td>3.8</td>
<td>3.2</td>
<td>2.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Casein (%)</td>
<td>6.0</td>
<td>4.2</td>
<td>2.4</td>
<td>0.2</td>
<td>0.1</td>
<td>0.09</td>
</tr>
<tr>
<td>IgG’s (%)</td>
<td>6.7</td>
<td>5.4</td>
<td>4.9</td>
<td>4.4</td>
<td>4.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>2.7</td>
<td>3.9</td>
<td>4.4</td>
<td>4.6</td>
<td>4.7</td>
<td>4.9</td>
</tr>
<tr>
<td>Lactose (%)</td>
<td>1.11</td>
<td>0.95</td>
<td>0.87</td>
<td>0.82</td>
<td>0.81</td>
<td>0.74</td>
</tr>
<tr>
<td>Minerals (%)</td>
<td>1.11</td>
<td>0.95</td>
<td>0.87</td>
<td>0.82</td>
<td>0.81</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Transition milk provides more energy and develops the digestive and immune systems.
Calves MUST be kept dry and clean after delivery

Hair insulates calf
- Insulation lost when wet
- Cow licks calf dry

Housing must be clean, dry and comfortable

Wet, dirty and uncomfortable housing use the calf’s energy reserves

On Farm Disease Prevention

Infectious disease prevention principles
- Contact probability
- Infectious dose
- Risk management
- Contagious disease control procedures
- Immune system management
  - Nutrition
  - Vaccination

Pathogen load
- The amount of pathogen(s) in the calf’s environment
  - Dependent on:
    - Biosecurity
    - The number of sick animals
    - How long the animals are sick
    - Early diagnosis
    - Correct treatment

- Goal: decrease pathogen load in the population
On Farm Disease Prevention

Contact probability

– The chance that an animal will be exposed to an infectious agent
• Depends on the amount of the agent in the environment and the density of animals
• Route of infection is important
  – Direct: oral, eyes, skin
  – Indirect: vector, vermin, fomite, airborne
• Goal: decrease contact probability

On Farm Disease Prevention

Infectious dose

– Each pathogen has a “threshold” needed to infect an animal
• Affected by
  – age of animal: young and old = lower ID
  – nutritional status: poor body condition = negative energy status = decreased immune function= ID
  – prior exposure: antibodies
  – fats in diet: protect gram negative bacteria from stomach acids
• Goal: Increase the infectious dose required to make a calf sick

On Farm Disease Prevention

Risk management

– Diseases occur at certain ages and management periods during an animal’s life
• Some diseases need certain conditions to be infective or contagious
  – e.g: internal parasites usually have part of their lifecycle outside the host (pasture)
  – Most diseases affecting dairy cattle are periparturient (before and after calving)
What Diseases do Young Calves Get?

Tend to be age specific:
- Diarrhea
- Septicemia
- Joint infections
- Pneumonia

Average and Range of Ages for Neonatal Calf Diseases

Calif. Animal Health and Food Safety Laboratory (CAHFSL) Data

Calf Diarrhea Agents in Neonatal Calves (CAHFSL)
Calves Need Energy for Maintenance, Growth, Temperature Control and to Fight Infections

Nutrition of Baby Calves

Old: Newborn calves should be fed 8% to 10% of their body weight of whole milk or its equivalent.
- 100 lb. (45 kg) Holstein calf therefore needs 1.2 gal. / day (4.5 liters)
- 1 gal. of milk (typical feeding/day) is not enough to meet the energy requirements for maintenance and growth.

New: 15% to 20% of body weight
### Nutritive Value of Whole Milk

<table>
<thead>
<tr>
<th></th>
<th>As Fed (Liquid)</th>
<th>Dry Matter</th>
<th>Milk Replacer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water:</td>
<td>88.0%</td>
<td>29%</td>
<td>20%</td>
</tr>
<tr>
<td>Fat:</td>
<td>3.5%</td>
<td>29%</td>
<td>20%</td>
</tr>
<tr>
<td>Protein:</td>
<td>3.1%</td>
<td>26%</td>
<td>20%</td>
</tr>
<tr>
<td>Lactose:</td>
<td>4.9%</td>
<td>41%</td>
<td>54%</td>
</tr>
<tr>
<td>Minerals:</td>
<td>1.0%</td>
<td>1%</td>
<td>1-6%</td>
</tr>
</tbody>
</table>

**20/20 Milk Replacer has 82% of the Energy Compared to Whole Milk**

### Starter Grain

- Key to good rumen development
  - The rumen develops due to volatile fatty acids produced during bacterial fermentation in rumen
  - *If we are going to underfeed calves, we had better develop the rumen as fast as possible*
- Important because consumption of dry feed is one of the criteria for weaning
- Fresh, dry, clean
  - remove day-old or wet feed
  - dumping on the ground leads to severe fly problems
- From 1 - 3 days of age feed small amounts and increase the amount as intake increases

### Water

*Free choice of water from birth*

- enhances more grain intake
  - = earlier weaning
- bacteria in the rumen need water
- If water and milk are fed in the same bucket: rinse bucket first with water before you give fresh water
- Supply a full bucket of water as needed
On Farm Disease Prevention

Immune system management
• Immune system has 2 basic parts:
  – Humoral immunity (antibodies)
    • proteins
  – Cellular immunity (white blood cells)
    • need glucose
• Animal must be in positive energy balance for the immune system to function

Calves Must be Growing for Vaccines or Antimicrobials to Work
• Antibodies = proteins
• White blood cells need glucose
• Starvation (negative energy balance) means calf can’t respond to vaccines
Proper Injection Site

Always inject SQ in neck
- Do not touch the back end or the mouth
  - pathogens
- Use small needles
  - Minimize pain
- Change needles often
  - Sharp needles less painful and spread less blood
  - Every calf or every 10th calf

Calm Handling Makes a Difference

Pain, fear, injury = “Stress”
- Increases steroids in calf
  - Decreases immune functions
- Decreases eating (Dry Matter Intake)
  - Will decrease energy available for immune system
  - Increases chance calf gets sick
- Manage the “stress” in the calves so the calves keep eating and drinking
  Calves determine if people are friends or foes within first days of contact

AVMA Welfare Policy Castration and Dehorning of Cattle
(https://www.avma.org/KB/Policies/Pagnc/Castration-and-Dehorning-of-Cattle.aspx)
- Both dehorning and castration should be done at the earliest age practicable.
- Disbudding is the preferred method of dehorning calves. Local anesthetic and nonsteroidal anti-inflammatory drugs (NSAIDs) should be considered for other dehorning procedures.
- Elastrator rubber banding techniques have been associated with increased chronic pain and should be discouraged. High tension-banding systems may be used with appropriate veterinary supervision and/or training in those situations where surgical castration may predispose to postsurgical complications.
- There are a number of acceptable castration techniques utilized by the cattle industry. The castration method used should take into account the animal's age, weight, skill level of the operator/technician, environmental conditions, and facilities available, as well as human and animal safety.
Disbudding/Dehorning calves

“As early as possible”
– Disbudding preferred – less tissue damage
• Validus: Local anesthesia and analgesia required if over 4 days old
  • Possible role of endogenous endorphins, steroids and behavior of newborn calves
• FARM program (assessment – not an audit) allows no pain management to 8 weeks of age
  • Disbudding preferred—horn buds considered up to 8 weeks

Castration

Perform as young as possible (1 to 3 days old)
• Rubber rings may be acceptable on newborns
• Not acceptable after 4 days old
• Consider pain management
• Local anesthesia and analgesia

The only true methods to manage pain from castration:
– General anesthesia
– Epidural anesthesia (high; not caudal)

American Humane Association

Teat Removal:
• Removal of supernumerary teats is not permitted unless their presence interferes with the placement of the milking cup. In these cases, removal of supernumerary teats must be performed within 4 months under local anesthesia.
• If removal of supernumerary teats is necessary for calves or heifers older than 4 months of age, the procedure must be performed under local anesthesia by a veterinarian.

Tail Docking/ Switch Trimming:
• Tail docking must not be performed.
• Switch trimming is permitted only as necessary.

Surgical Procedures:
• Surgical procedures such as Caesarian-sections must be performed by a qualified veterinarian.

Sick Calf Treatment and Biosecurity

• Use Contagious Control Procedures
  – Do not touch calf, unless absolutely necessary

• Diagnose and Treat Early
  – Wrong diagnosis = poor response to Treatment
  – Early treating = best recovery rates

• Treat Correctly, INCLUDING NURSING CARE
  – Sick calves need warmth; clean soft bedding
  – Cannot thermo-regulate well
  – Fluids for cases of diarrhea

Neonatal Calf Diseases: Nursing Care

Diarrhea

• Calves tend to be treated with 1 to 2 liters fluids IV or PO
• 100 lb calf 7% dehydrated needs 3.5 liters for euhydration
• Calf needs energy
• Needs comfortable housing

Pneumonia

Clinical signs: depressed, fever, breathing fast
• Calves with pneumonia breath fast because they have reduced lung capacity
• Calf needs pain relief and anti-inflammatory Tx
• Nursing care for nutrition
• Comfortable, well ventilated housing
• Needs more than antimicrobial TX
Why Antimicrobials Don’t Always Work

“The drugs do what they are supposed to do.”

- **Stop treatment too soon**
  - General rule is it takes 2-3 days to control infection, 1-2 days more to eliminate it
  - Leaves resistant bacteria, makes re-treat success more difficult

- **Start treatment too late**
  - Pneumonia tissue walled-off, difficult for drugs to penetrate infected area
  - Organ failure

- **Wrong diagnosis**
  - Septicemia versus pneumonia

- **Wrong drug choice/ dosage/ frequency**
  - Under MIC too long

- **Starving calf**
  - Immune system needs energy
  - Immune system more important in fighting infection than drugs

Late or Wrong Treatment will increase the pathogen load on the farm

---

 Trouble Shooting Calf Problems

**Calves sick or dying within first 3 days:**

- Maternity area too dirty
- Poor or no colostrum
- Dirty or crowded transportation
- Bacteria load in milk

---

 Trouble Shooting Calf Problems

**Calves sick or dying > 4 days**

- Nutrition
  - Thin calves susceptible to disease
  - Vaccines and drugs won't be effective
- Sanitation
  - Filth = increased pathogen load
- People spreading pathogens
- Contaminated milk or milk replacer
- Ventilation
Trouble Shooting Calf Raising

Manage:

- Welfare
- Pathogen Load
- Contact Probability
- Infectious Dose

Animal Welfare Issues and Calf Raising

- Handle calmly and gently from birth
- Feed enough calories to maintain positive energy balance
- Colostrum to all calves
- Housing must be clean, dry, comfortable and allow movements
- Allow calf-calf contact for development
- Painful procedures:
  - Dehorning – disbud at 1 to 3 days of age
  - Don’t remove extra teats
  - Injections – use SQ or oral when possible
- Euthanasia
  - When an animal is suffering it must be humanely euthanized