Calf Management in the First 60 Days: Opportunities to Improve Health and Performance

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Introduction

The components of a successful calf raising operation are health, performance, production and profitability of the replacement heifers. Returns on the significant investment made to maximize each of these important components may be delayed but do reward the significant commitment to provide a comprehensive care package to all calves. The care package includes colostrum, a high plane of nutrition, an optimal calf environment and intensive health management. The goal of this presentation is to provide a practical approach to maximize performance in the first 60-days of the calf's life, with an emphasis on ideas to improve colostrum, nutrition, environmental management and health in the first 60 days.

Reducing Mortality in the First 24-hours of Life

Most calves that die within the first 24-hours of life are alive at birth and simple strategies that do not rely on drugs or oxygen delivery may prevent death. Of foremost importance to improved survival in the first 24-hours is unassisted vaginal delivery of calves. With a normal presentation and sustained progress, observe calving from a distance and provide no assistance. For calving cows that are moved during second stage labor, expect labor to stop temporarily and allow time for labor to resume before providing assistance. In a recent study (Schuenemann et. al.), 65 minutes was suggested as the time from the appearance of feet outside the vulva to intervention for cows that need calving assistance.

After delivery, calving attendants should watch closely for behavior indicative of normal adaptation to life outside the uterus.

- Head righting begins within minutes.
- The calf is sitting in a sternal position within 5 minutes.
- The calf makes standing attempts made within 15 minutes.
- Shivering begins within 30 minutes of delivery.
- The calf is standing by 1 hour.
- The calf is suckling within 2 hours of delivery.

Without appropriate movement and reflex activity, the newborn calf's body temperature declines from an elevated level at birth to 101-102° F within an hour. It will continue to decline if the calf is not active and shivering. Death due to hypothermia can occur within 1 to 2 hours, especially when the environmental temperature is below 58° F, the low end of a calf's thermal neutral zone.
For calves that have flaccid muscles, are unresponsive to stimulation, have blue membrane color or are breathing irregularly, simple techniques may be used to revive the calf and stimulate regular breathing. Place the calf on a low platform, cart or table to facilitate the following procedures.

- Place the calf's head over the edge of the raised platform for 10 to 15 seconds to get postural fluid drainage from the mouth and nose.
- Place the calf in a sitting position if possible. Take a clean, dry towel and rub the topline of the calf from the tailhead to the poll.
- Use the towel to stimulate the ears, eyelids and nose of the calf.
- Ice water can be poured onto the head or into the ear of the calf to stimulate breathing.
- Compress and then shake the trachea (wind pipe) high up in the neck to stimulate a cough reflex.

- Place pinpoint pressure right in the center of the muzzle between the nostrils or place finger pressure across the nasal septum where nose tongs would be placed to further stimulate breathing.

Put Colostrum Testing into Action

Failure of passive transfer of immunity (FPT) is recognized as a major problem that has negative short- and long-term consequences for the health and productivity of herd replacements. Many dairy calf raisers routinely monitor serum total protein (STP) concentration of calves but use the results in a limited way. Results can be used to classify individuals as high risk calves when STP concentration is ≤ 5.0 gm/dl. High-risk calves can be marked so that intensified health screening procedures are used on these individuals.

To classify a herd as an FPT herd, a minimum of 10 to 12 STP results from calves less than 7 days of age are needed. When more than 20% have STP < 5.5 gm/dl or more than 10% have STP < 5.2 gm/dl, the colostrum program needs attention. When using STP data from refractometer readings, it is imperative that the refractometer is calibrated. The simplest calibration step is to verify that the specific gravity scale of the refractometer reads 1.000 after application of distilled water. Adjust as necessary. At least every 6 months, split serum samples and correlate STP concentrations between an accredited laboratory and the refractometer. Perform serum testing at room temperature.

A systematic review of colostrum protocols on the dairy usually is necessary to find the reason for herd based FPT. Colostrum volume, quality, cleanliness and absorption factors should be reviewed to find potential problems.

- Inadequate volume of colostrum is administered.
  - Less than 4-quarts of colostrum is administered with an esophageal feeder.
  - Less than 3-qt of colostrum is given to calves that suckle.
- The colostrum quality is inadequate. Common reasons for reduced quality include:
  - High producing cows – colostrum dilution occurs soon after calving
  - Delayed milking – time between calving and milking exceeds 4 hours.
  - Calving cows are suckled before colostrum collection (Note: calves that remain with the cow for 30 to 60 minutes after birth frequently have suckled before they are removed from the pen.)
  - Calving cow has leaked milk or been pre-milked before calving.
  - The dry period length was less than 30 days.
  - There are significant nutritional problems with the close-up dry cows (Note: this problem usually results in reduced colostrum volume rather than the quality)
  - There are significant health problems in the calving cows (Note: the effect is usually reduced volume rather than the quality).
  - Limited or poor vaccination program (Note: Vaccination of the dry cows is important for immunity to specific diseases of calves. Vaccination does not have a quantitative impact that can be measured by colostrometer or Brix refractometer)
- Colostrum immunoglobulin absorption is impaired.
  - Colostrum feeding is delayed ≥ 4-hours after birth.
  - There is excessive bacterial contamination (> 100,000 cfu/ml) of colostrum (Note: probiotics should not be added to colostrum)
  - Colostrum supplement or replacement powder is added to colostrum.
  - There is a high level of calving assistance

Train Calf Care Providers to Use the Esophageal Feeder

Comfort with proper use of the esophageal feeder amongst calf workers will improve herd FPT problems and reduce mortality due to diarrhea-induced dehydration. For colostrum administration, use a 4-quart capacity esophageal feeder. For the administration of an oral electrolyte solution, use a 2-quart esophageal feeder. Never use the esophageal feeder in a calf that cannot maintain sternal recumbency (standing position is preferred), in a calf that is having

respiratory difficulty, or that has abdominal distension. While passing the esophageal feeder, maintain the head of the calf in a neutral position so that the nose is below the plane of the ears.

Esophageal feeders should be cleaned and soaked in a disinfectant between uses. Therefore, have as many esophageal feeders as will be used (maximum use) in a day. Do not use the esophageal feeder to force feed milk or milk replacer without a protocol from your veterinarian and an established limit to the number of successive forced feedings.

Nutrition

Have a nutritional plan that will allow calves to double birth weight by 60 days of age. Whether the diet is whole milk or milk replacer, use the Nutrient Requirements of Dairy Cattle (NRC) to make the feeding plan. Implement a winter-feeding program when the temperature falls below 55° F and determine what milk or milk replacer intake is needed to meet weekly goals for average daily gain (ADG). A winter feeding plan for calves on whole milk in Wisconsin may look like the one shown in Table 1.

Table 1. Whole Milk Winter Feeding Plan for Holstein Calves in Wisconsin

Age	**Whole Milk Volume**
0-3 days	2 quarts twice daily
3-10 days	3 quarts twice daily
10-49 days	4 quarts twice daily
49-56 days	4 quarts once daily
56-63 days	No milk

Understand what milk or milk replacer and starter intakes are needed to meet weekly goals for gain to double birth weight by 60 days. The NRC calculator can be used to estimate the protein and energy allowable ADG, using calf weight and environmental temperature as variables. Feeding to meet the targeted weekly ADG's shown in Table 2 can result in doubling the birth weight of an 80 lb Holstein calf at 56 days of age.

Table 2. ADG expectations when using the NRC calculator to assess calf feeding management

Week	**Body Weight**	**Estimated Starter Intake (lb)**	**Average Daily Gain (lb/day)**
1	Ave birth wt	0.25	1.0
2	Birth wt +7	0.5	1.2
3	Week 2 + 8.4	0.75	1.6
4	Week 3 + 11.2	1.0	1.8
5	Week 4 + 12.6	1.5	2.0
6	Week 5 + 14	2.0	2.0
7	Week 6 + 14	3.0	1.4

Monitor feeding consistency on a regular basis. Calculate and measure milk or milk replacer total solids delivered in each batch of liquid feed. Consistency of the liquid feed (less than 1% difference) from the first calf fed to the last, from one feeding to the next and between feeders will reduce the risk for nutritional diarrhea, bloat, ulcers and abomasitis. Total solids should never be greater than 18%. Brix readings can be used to monitor liquid feed consistency.

Monitor the bacterial quality of the milk or milk replacer being fed to calves. Standard plate counts and selective bacterial counts can find post-pasteurization contamination of milk or contaminated nipples at automatic feeder stations. Bacterial contamination of milk or milk replacer puts calves at high risk for infection and may affect the nutritional value of the feed. Table 3 shows the effect of dirty nipples at automatic feeding stations on the bacterial quality of pasteurized whole milk.

Table 3. Milk replacer culture results

Select Microorganisms Counts (CFU/ml)	Pen 1-1	Pen 1-2	Pen 2-1	Pen 2-2	Goal Levels
Total Plate Count (CFU/ml)	5,400,000	6,250,000	5,150,000	1,300,000	**< 10,000**
Coliforms (lactose-positive)	1,750,000	150,000	2,550,000	200,000	**< 100**
Gram negative rods (lactose-negative)	0	3,400,000	350,000	300,000	**< 5,000**
Streptococci (non-agalactiae)	3,350,000	2,600,000	2,000,000	750,000	**< 5,000**
Staphylococci (coagulase-negative)	300,000	100,000	200,000	50,000	**< 5,000**
Comments	Several lactose + morpholo-gies	Probable *Pseudo-monas spp*	*Pseudo-monas* and many lac + morpholo-gies	*Pseudo-monas* and many lac + morpholo-gies	

Health Screening

One of the biggest challenges of raising calves is early detection of health problems. Instituting regular health screening exercises will reduce mortality, shorten disease duration and improve treatment outcomes. In the absence of activity, appetite, or fever monitoring technology, a daily chore is to find abnormal calves, calves that remain standing after feeding when 90% of the calves are sleeping, calves with diarrhea, sunken eyes, eye or nasal discharge, abnormal head posture (tilted or star-gazing) or coughing frequently. This daily observation can be coordinated with the pick up of refused feed. The abnormal calves, the pen or the calf hutch of the abnormal calves are marked, indicating that these calves need a complete examination by the trained individual(s) assigned to that duty. The components of the basic exam are:

- Head position (tilted, star-gazing)
- Eye or nasal discharge – color, consistency and amount
- Temperature
- Fecal consistency
- Breathing pattern (abdomen vs. chest) and effort (inspiration vs. expiration)
- Navel exam (diameter, temperature, exudate)
- Fecal consistency
- Lameness, joint swelling
- Abdominal size and contour

On a twice a weekly basis, a more detailed calf health (Calf health scoring app – I-tunes store) or respiratory disease screening (http://www.vetmed.wisc.edu/dms/fapm/fapmtools/8calf/calf_respiratory_scoring_chart.pdf) is recommended for all calves. For health screening, it is estimated that an additional 0.5 full time equivalent (FTE) is needed for each 150 to 200 calves. For all calves that die, a post mortem examination is recommended. Farm staff can be trained to open, examine and take pictures of lesions that can be routinely reviewed by the farm's veterinarian. Samples from dead calves can be a valuable tool to refine protocols, identify training needs or diagnose herd problems.

Safe, Smart and Strategic with Calf Vaccinations

The goals for vaccinating young calves are to provide optimal immunity to the disease agents that calves are most likely to encounter so that they can be protected during the period of maximum challenge. In the face of maternal immunity from colostrum, the vaccination route is likely to be intranasal or oral. Vaccination is for healthy calves on a good plane of nutrition. Avoid repeated (weekly or every other week) vaccinations. Don't use half-dose or alternate vaccination routes unless there is good evidence for safety, effectiveness and disease protection. At the very least, do no harm.

Summary
Maximize performance, health, welfare and profitability of replacement heifers by focusing on the first 60 days of the calf's life: newborn survival, colostrum, nutrition, optimizing the calf environment and regularly screening for health problems.