



### Maximizing Passive Immunity in Calves

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#### 5 Factors of a Calf Management program

1. Minimize stress of birth
2. **Maximize passive immunity**
3. Meet nutrient requirements of calf
4. Optimize rumen development
5. Maintain animal health

On average in the U.S. 7.8% of heifer calves born alive, die before weaning, and over 75% of calves will experience one bout of illness prior to weaning. The primary causes of calf-hood illness prior to weaning are scours/digestive issues and respiratory challenges.

What are the costs of calf death and calf illness?

- Reduction in net farm profits
- Decreased availability of herd replacements
- Deceased voluntary culling
- Potential limitation of genetic gain
- Decrease in future production

Newborn calves are born with an immature immune system that can not fight off disease. The newborn calf derives passive immunity - and the ability to protect itself from illness - by absorbing IgG from maternal colostrum (**MC**) provided within the first hours of life . In the calf, passively acquired immunity is important to the health of the calf until they are able to synthesize their own antibodies—around 6 weeks of age.

During the first 12 -24 hours after birth, the intestines of the newborn calf are replacing fetal type cells with adult-type enterocyte cells. These fetal type cells are able to transport macronutrients - specifically IgG across the intestine to the blood during the first hours of life - thus allowing the calf to achieve passive immune transfer from colostrum.

#### To maximize passive immunity in the calf:

- Calves should receive their first feeding of high quality colostrum within 4 hours of birth.
  - The longer you wait, the less IgG the calf is able to absorb.
  - The less IgG the calf absorbs, the more susceptible the calf is to pathogens (scours, respiratory challenges...)
- Calves should receive a minimum of 10% of their bodyweight in colostrum within the first 4 hours of life.

#### What is high quality colostrum?

- High quality colostrum contains greater than 50 mg of IgG /mL of colostrum.
- Is **not** contaminated with manure or foreign particles.
- Is not bloody or watery.
- Is from a healthy, disease free cow.

#### How can you evaluate colostrum quality?

- Test Colostrum to determine if it is high quality.
  - Colostrum should register in the green level on a **colostrometer** (above 50 mg IgG/mL)
  - Colostrum should be  $\geq 20$  %Brix on a **refractometer**.
- **Visually Inspect** colostrum.
  - Make sure the colostrum being fed is clean and not contaminated.

#### Cleanliness

During the first hours of life, when the intestine is able to transport whole macromolecules from the gut to the bloodstream, bacteria and pathogens can also be passed directly to the bloodstream. To prevent the transport of pathogens to the bloodstream we need to take preventative measures, both in the calving pen and with colostrum handling.

1. Make sure the calf is born in a clean pen.
2. Move the calf into a clean pen or hutch immediately after birth.
3. Properly clean the teats prior to milking the dam. This is the first time in 6 weeks the cow has been milked and a lot of bacteria could be on the teats.
4. Make sure all milking equipment is sanitized prior to milking.
5. Make sure all buckets & bottles are clean.
6. Feed colostrum within 1 hour of harvesting from the cow. If you are not going to feed colostrum within 1 hour you can freeze colostrum in 1 gallon Ziploc bags.

To evaluate your colostrum management program and the health of your newborn calves, it's beneficial to determine if your calves are achieving passive transfer. Passive transfer of IgG can be determined from blood collected from the calf after 24 h of age. Neonatal calves are classified as having failure of passive transfer if the serum total protein is  $< 5.0$  (as measured on a refractometer - can be done calf side) or the IgG concentration is  $< 10$  mg/mL (lab test) after 24 h of age. Failure of passive transfer (**FPT**) increases risk of death and illness due to increased susceptibility to pathogens and subsequent disease. The most recent NAHMS reported that 19.2% of heifer calves had FPT and only 2.1% of U.S. dairy operations routinely measure passive transfer status of calves.

**Improved colostrum management practices can reduce occurrences of FPT in calves, improve calf health and farm profitability.**

If you would like additional resources on any of the information discussed in this article please do not hesitate to contact me. [kmm434@cornell.edu](mailto:kmm434@cornell.edu)