

Calving Ease

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Colostrum: Yet another Update

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How our management choices shortchange our calves

The most common colostrum management protocol among our US dairies seems to be:

1. Milk fresh cow when it fits conveniently into the workflow of the dairy – often 8 to 14 hours post calving – this delay in first milking can easily decrease colostrum antibody levels as much as 1/3 compared to when the cow calved.
2. Rather than feed colostrum right after collecting it, dairies store colostrum either refrigerated or frozen – resulting in near zero white blood cell (leukocytes) content – this protocol deprives the calf of a supply of mature, programmed cells from the dam.
3. Feed first-milking colostrum only on day 1 followed by either milk or milk replacer starting on day 2 – thus depriving the calves of both the enhanced nutrients and bioactive compounds found in milk harvested during the first few days after the cow calves (often called transition milk).

Role of colostrum on gastrointestinal tract development

We often fix our attention on the immunity-enhancing role of colostrum. However, what about these other effects on the gut?

Most of us do not use the terms “cell proliferation,” “cell differentiation,” and “protein synthesis” in our everyday conversations. I certainly do not talk about “villus height” and “crypt cell differentiation” at the local coffee shop. Nevertheless, they are all terms used to describe the ways colostrum-borne growth factors stimulate gut or gastrointestinal tract development.

Especially when preweaned calves have adequate amounts of protein and energy in their diet, their feed efficiency can improve as much as 50 percent compared to colostrum-deprived animals. Research suggests that this improvement happens through both (1) greater surface area for digestion and absorption and (2) more capacity to digest more nutrients due to higher enzyme secretion. (p36).

In other words, one response to the hormones and growth factors in colostrum is to set up calves to more efficiently (1) digest their milk ration as newborns and (2) move those nutrients into the calf's blood where they can be used for both maintenance and growth.

Role of colostrum on immunity

That early feeding of clean high-quality colostrum in adequate volume enhances passive immunity is pretty well known in the dairy community.

Are there other colostrum contributions to immunity?

Yes, Improved rates of gut maturity will support rapid growth of the calf's own immunity, Remember, however, that lots of both energy and protein are needed to build these immune cells and tissues.

Another avenue by which the adult cow communicates biochemical information to her calf via colostrum are leukocytes. Van Amburgh refers to them as "mature, programmed cell." They carry pathogen-specific information from the dam. These fragile cells are present in colostrum when it is collected. They are destroyed when colostrum is frozen and thawed. In refrigerated colostrum it has been observed that their numbers drop drastically within the first day.

The ideal source of leukocytes is freshly collected colostrum. The "milk & feed" colostrum management protocol mimics the nursing calf. You might ask, "How long do these leukocytes hang around in the calf's blood?" "Maternal leukocytes can be detected in calf circulation within 12 hours, peak at 24 hours and disappear by 48 hours" (p39).

So, if they are no longer in the blood where did they go? They concentrate in other tissues and lymph nodes. Still available. Some research has detected them as long as 5 weeks after colostrum feeding. Calves have been shown to respond more strongly to pathogen challenges when fed leukocyte-rich colostrum compared to leukocyte-free colostrum.

Take home ideas for strengthening colostrum management

- 1. Keep good records on colostrum feeding – timing, quantity, quality, periodic checks on bacteria counts.**
- 2. Goals: first feeding of 4 quarts of high quality, clean colostrum within first 4 hours of life (large breeds).**
- 3. Adapt farm protocols to allow colostrum collection as soon as the dam is standing post-calving [highest quality colostrum available].**
- 4. Adapt farm protocols to permit feeding of colostrum within 30 minutes after it is collected (assumes adequate volume and quality).**
- 5. Adapt farm protocols to permit collection of second and subsequent milkings (often-called transition milk) and prompt feeding to newborn calves.**

Reference: Van Amburgh, M. "What's Golden in Colostrum: Communication from the Dam to the Calf." Proceedings of 4-State Dairy Nutrition and Management Conference, June 13, 2018 Debuque, IA., pp 33-40.

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