



## Enrichment; boosting your free maternal colostrum to guarantee quality

*Many farms wish to use the colostrum they already have available, but often it falls short of perfect. A new way of feeding colostrum allows producers to boost the quality their maternal colostrum before feeding it to the calf.*

It is now widely known colostrum is essential for calf survival, performance and has impacts on lifelong productivity.

Colostrum management typically involves managing colostrum and implementation protocols with emphasis on four main points:

1. Timing of administration (within the 1st two hours and a second feeding within 12 hours)
2. Colostrum Quality (concentration of IgG antibodies greater than 50 g/L)
3. Colostrum cleanliness (low pathogen load or bacteria counts)
4. Colostrum quantity (typically 10% of the body weight in kg).

These management facets are all equally important. For example, a producer could do a good job managing three out of the four and yet still have poor calf health. If let's say the timing, colostrum cleanliness and colostrum quantity are all being managed well, but the colostrum lacks proper antibody

levels, it results in more calves failing transfer of passive immunity (FTPI). When calves either do not get enough colostrum antibodies or none, the risk for scours, respiratory disease and overall death loss increases by upwards of four-fold in the first 60 days of life. This happens because in a sense the dam of the calf is passing her immunity onto the calf via the colostrum, and this is also why we call the phenomenon passive transfer. For this article, let's focus on the colostrum quality or concentration of antibodies/IgG. And while we will discuss the proper antibody levels, it is important to realize **colostrum is much more than just antibodies**. It is packed full of on the order of hundreds of bioactive factors, natural pre-biotics, nutrients and vitamins/trace minerals.

### **How do you determine the antibody or IgG concentration in colostrum?**

While the gold standard way to measure colostrum antibody/IgG concentration is by a highly technical laboratory method called radial immunodiffusion, an indirect way to measure it on farm is with an optical or digital brix refractometer. Again, these devices are "indirect" measurements of true colostrum IgG content and are indeed about 80% accurate. A brix level of 22% equates to approximately 50 g of IgG per L. Therein, if a person were to feed a 90lb/40kg calf 4L of 22% brix colostrum, it would provide a mass of 200 grams of IgG to the calf. This has served as a rule of thumb

over the years for a Holstein calf which is to feed 10% of the body weight (.1 X 40 = 4L) at 22% brix (50 g IgG/L x 4 = 200 grams IgG). There are new recommendations; however, indicating calf morbidity and rate of failed transfer of passive immunity (FTPI) decrease by providing more colostrum antibody/IgG. In fact, these new recommendations aim now to provide 300 grams of IgG in order to achieve excellent passive transfer. So what does this mean in terms of brix? **Well, it means we need to raise standards on farm to select colostrum with brix levels above 24% brix.**

**Should we brix every batch of colostrum fed or every milking of colostrum from individual cows?**

The answer is yes, we should. The reason being is colostrum is highly variable in terms of antibody concentration. In fact, there are genetic differences between cows, dry cow nutrition, seasonality, parity and timing of collection are just some of the factors, to name a few, which contribute to the variability. Research over the years has shown that upwards of 30% of colostrum has antibody below 50 g/L (and remember this is based on old standards where 22% brix = 50 g/l IgG) and a recent survey study conducted by the National Health Monitoring Study in 2014 showed approximately 23% of colostrum to have below 22% brix. This is something to consider when new standards indicate to feed colostrum with greater than 24% brix levels. Does this mean as well that colostrum is worthless below 22 % brix? How can we manage to use colostrum below 24 % brix? First and foremost, **one rule of thumb which still stands true today is to discard any colostrum with brix levels below 15-16%.** Brix levels at these levels typically indicates colostrum has less than 30 g of IgG per Liter and it does not provide enough immunity for calves.

**So what if the colostrum brix test between 15-24% brix?** One solution is to use this colostrum for a second feeding between 6-12 hours birth; however, a new application called "enrichment" can be performed with efficacy.

**There is a solution!.... Enrichment!**

Enrichment involves adding a precise amount of colostrum replacer powder directly to maternal colostrum. Therein if the brix level falls between 15-24%, enriching with colostrum replacer of a consistent IgG level can indeed turn poorer quality colostrum into excellent quality maternal colostrum.

A new research study conducted at the University of Guelph proved this to be an efficacious way to improve maternal colostrum. In the study, Researchers fed maternal colostrum at various brix levels with the lowest level being 15.8% brix (equated to 30 g of IgG per liter).

On calves fed maternal colostrum at 15.8% brix, 18.8% failed transfer of passive immunity.

They also fed colostrum which was enriched from 15.8% brix up to 26% brix and were able to achieve good levels of passive transfer while have 0% of calves failing transfer of passive immunity (compared to the 18.8% mentioned had they not enriched).

The Researchers also enriched from 20.3% brix to 31.3 % brix and they achieved on the average excellent passive transfer in the calves. In fact, the calves fed the 20.3% brix colostrum had only 50% of the calves achieving excellent passive transfer and 6.25% achieving fair passive transfer.

After enriching the 20.3% colostrum to 31.3% brix they were able to achieve higher passive transfer levels with **62.5% of calves achieving excellent passive transfer and 0% achieving fair passive transfer (vs only 50%).**

**Table 4.** Milk consumption for calves fed milk replacer at 12, 24, 36, and 48 h post-colostrum feeding (n = 80; 16/ treatment)

Category	Treatment <sup>1</sup>					SEM	P-value
	C1	C2	C3	30-60CR	60-90CR		
Excellent <sup>2</sup> , %	0	50	100	6.25	62.50	0.04	< 0.01
Good <sup>2</sup> , %	0	43.75	0	62.50	37.50	0.11	< 0.01
Fair <sup>2</sup> , %	81.25	6.25	0	31.25	0	0.03	< 0.01
Poor <sup>2</sup> , %	18.75	0	0	0	0	0.17	< 0.01

<sup>1</sup>C1 = maternal colostrum (30 g/L IgG); C2: maternal colostrum (60 g/L IgG); C3: maternal colostrum (90 g/L IgG); 30-60CR: maternal colostrum (30 g/L IgG) enriched with colostrum replacer for a final concentration of 60 g/L IgG; 60-90CR: maternal colostrum (60 g/L IgG) enriched with colostrum replacer for a final concentration of 90 g/L IgG  
<sup>2</sup>Failure of passive transfer or success of passive transfer categories classified by serum IgG values at 24 h after birth by Lombard et al. (2020). Excellent = ≥ 25.0, good = 18.0 to 24.9, fair = 10.0 to 17.9, and poor = < 10.0 mg/mL IgG.

Again, based on research indicating lower morbidity for calves achieving excellent passive transfer, the enrichment strategies proved to improve transfer of passive immunity and significantly decrease the percentage of calves failing transfer of passive immunity.

Enrichment is an excellent way to still use maternal colostrum that you have on hand from the dam and boost it's quality with a colostrum product.

Written by:

**Mike Nagorske, DVM**

Director of Research, SCCL

mike.nagorske@sccl.com