Is there an advantage to feeding colostrum 3 versus 2 times within 12 hours of birth?

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I have been under the impression that once a calf consumes colostrum after birth, that begins to shut down their ability for the absorption of antibody proteins whole through the intestinal wall into the blood stream. If so, then is there any advantage to feeding more colostrum shortly after the initial colostrum feeding? And what if the first colostrum feeding is not up to 4 quarts? Does that large amount of colostrum fed, limit antibody absorption by overloading antibody absorption ability? In the United States, small farms (30 to 99 cows) feed ~4 quarts colostrum in the first 24 hour, and large farms (≥500 cows) feed ~6 quarts or more (NAHMS, 2014). But the number of meals were not reported.

Thus, Lopez et al., 2022 hypothesized that reducing total IgG mass fed at birth by increasing the number of colostrum meals would increase apparent efficiency of antibody absorption (AEA). This study was done to evaluate effects of two different colostrum feeding frequencies, low and high, by delivering a determined volume according to birth body weight (BW) in 2 or 3 meals. Also evaluated was whether an upper limit of IgG absorption existed or whether AEA is decreased when a larger meal is fed at birth.

First and later lactation Holstein cows at the University of Guelph in Canada were monitored during the calving process, and assistance was provided when needed. Male Holstein calves born in the maternity pen were immediately separated from their dams to prevent colostrum suckling. Male Holstein calves (n = 40; 20 per treatment) born from November 2020 to December 2020 were randomly assigned to treatment to receive a colostrum replacer (CR) following either (1) a low-frequency (LF) or (2) a high-frequency (HF) feeding protocol. Calves in the LF treatment were offered CR within 1 hour after birth (8% of birth BW) and 12 hours (4% of birth BW) after the first CR feeding. The HF calves received CR within 1 hour after birth, and 6 and 12 hours after the first CR feeding (4% of birth BW per meal).

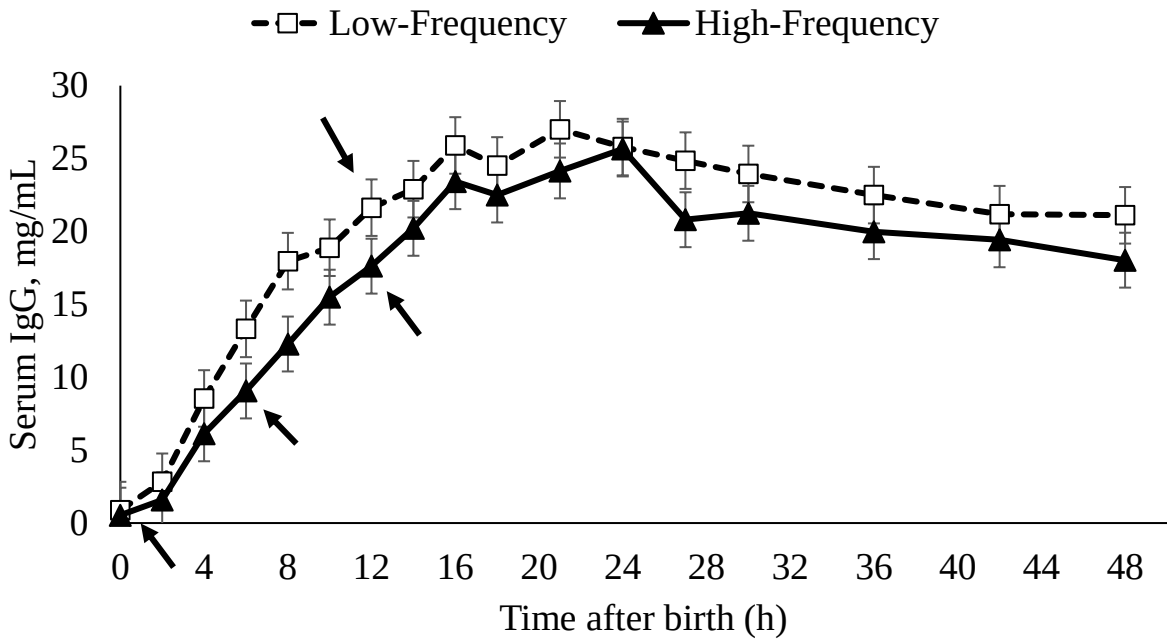
All calves were fed CR only at a total of 12% of birth BW. The CR powder used was derived from bovine dried colostrum, contained IgG at 30% DM, and was reconstituted with water to 70.5 g of IgG/L when fed (Saskatoon Colostrum Company Ltd.). The composition analysis of the CR was: 30% IgG, 60.7% CP, 14.3% crude fat, 8.0% lactose, and 6.4% moisture. Reconstitution of CR was as follows: (1) weighing CR powder, (2) weighing warm (40°C) water, (3) reconstituting the solution by adding CR powder to a bowl and slowly adding water while mixing with a whisk for approximately 2 minutes, and (4) weighing the reconstituted solution to verify it matched with the final mass to be fed. After verification, reconstituted CR was transferred to a 4-L esophageal tubing bottle. All CR meals were offered via an esophageal tube, and calves were not allowed to voluntarily consume colostrum. The first CR feeding was fed to all calves 1 hour after birth. After the corresponding CR meals, all calves were fed (5% of BW) pasteurized waste milk at 24, 36, and 48 hours after the first CR feeding via nipple bottle. Milk was heated to ~39°C in a warm water bath before feeding. Refused milk was weighed and

recorded for every feeding. Calves were weighed at 48 hours immediately after the last milk feeding when their experimental enrollment concluded.

Birth BW among calves did not differ (table). Nor did 48 hour BW, baseline serum IgG, and serum total protein (STP). But area under the curve at 6, 12, 24, and 48 hours were significantly greater for low versus high frequency feeding of colostrum replacer.

Colostrum replacer fed at:	**Low frequency**	**High frequency**	**SEM**
Birth BW, lb	102.4	100.4	2.11
48 hour BW, lb	105.9	104.2	2.09
Baseline serum IgG, g/L	0.8	0.5	1.27
IgG 24 hour, g/L	25.8	25.7	1.28
Serum Total Protein 24 hour, g/dL	6.3	6.3	0.26
Apparent efficiency of absorption, %	27.6	27.7	1.26
Area under curve, 6 hour	36.5	25.1	2.66
Area under curve, 12 hour	145.2	105.9	5.91
Area under curve, 24 hour	443.1	379.6	15.17
Area under curve, 48 hour	997.8	855.7	44.5

The area under the curve (AUC) which was greater for 6, 12, 24, and 48 hours for low frequency (fed twice within 12 hours after birth) than for high frequency (fed 3 times within 12 hours after birth) indicated no advantage for feeding lesser amounts each time but more times after birth. But there really was no difference in serum total protein at 24 hours after birth and no calves were categorized as having poor (<10 g/L) or fair (10.0 to 17.9 g/L) Ig levels as proposed by Lombard et al. (2020). However, the graph shows, if anything, some tendency for increased serum total protein for low versus high frequency feeding of the colostrum replacer.



The authors did acknowledge that it would have been good to have had a single colostrum replacer feeding as a 3rd treatment to see if there was any further benefit to feeding the same total amount but in 2 or 3 time feedings within the first 12 hours after birth.

The Bottom Line

There was no benefit to feeding 3 meals versus 2 meals of colostrum replacer within the first 12 hours after birth. But no calves in either of the 2 feeding regimens in this study had failed transfer of passive immunity or were categorized as having poor or fair IgG levels. Thus, colostrum management does not require dairy producers to offer 3 colostrum meals within the first 12 hours of life.

References

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