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Calf Note #164 – Effect of neonatal serum protein content on growth of calves

Introduction

Calf raisers are constantly reminded (some would say nagged) of the importance of feeding colostrum to their calves. They are told that colostrum is essential to health, growth and later production. More and more information is coming available to document the value of colostrum feeding on growth and health of calves.

A recent publication considers the role of colostrum consumption on the survival, health, and growth of young dairy calves. The study provide insights into the importance of the first day of life on calf health, and, ultimately, the profitability of the calf raising enterprise.

Experiment – heifers in Poland

A Journal of Dairy Science article by Furman-Fratczak et al. (2011) reported the results of a study using 400 Holstein calves raised on one dairy farm in Poland. Calves were fed 1st milking colostrum from the dam within about 2 hours of birth. Calves were then fed colostrum for the next three days, and fed according to the normal milking schedule of the farm. They were also injected with an autogenous vaccine at 2 and 14 days of life.

Subsequent to colostrum feeding, calves were raised according to the normal management of the farm. Colostrum IgG was estimated by colostrometer; serum IgG was measured by RID after consuming colostrum (blood was taken at about 35 hours of age); and health and growth of calves was monitored throughout the study.

	Serum IgG concentration			
Item	<5	5-10	10-15	>15
No. of calves	22	83	55	15
BW, kg	39.7	39.9	39.9	38.8
MC intake, L	1.36	1.74	1.85	1.83
Serum γ-globulin, g/L	3.70	7.44	12.03	16.96
Scours *	18.2	6.0	0.0	0.0
Scours**	37	34	28	27
Respiratory**	28	18	8	0
Age at breeding, d	484	468	475	454

*Percent of calves, days 1-14.
**Percent of calves, days 15-150.
Adapted from Furman-Fratczak et al., 2011.

Table 1 shows the "tale of the tape" for this farm. Colostrum quality overall was good – average IgG concentration was 79 g/L, which exceeds the standard of 50 g/L that is considered "good" quality. However, the authors did report that 9% of the calves with the lowest serum IgG concentrations were fed colostrum that was low in IgG or was watery and thin.

The biggest factor affecting serum IgG concentration in the study (and the reason they had so many calves with serum IgG concentrations <10 g/L) was poor colostrum intake. Calves only consumed from 1.4 to 1.8 L of colostrum (1.5 to 1.9 quarts) in the first feeding. If we assume the IgG concentration averaged 79 g/L, this calculates to between 111 to 142 grams of IgG consumed. This is well below the recommended 150 to 200 grams of IgG recommended to be consumed in the first meal.

Why did calves consume so little colostrum? Most were only fed to appetite. Many calves in this study – especially those in the lowest serum IgG group – had a low vitality score (this score measures how quickly the calf stood and was ready to suckle). The authors reported that calves with low vitality didn't drink much and ended up with lower serum IgG concentrations.

As expected, calves in the lower serum IgG groups (i.e., less than 10 g/L at 48 hours) had a greater proportion of diarrhea, especially in the first 14 days of life. Later diarrhea (from d 15-150) was less affected by serum IgG concentration; however, by 4-6 weeks of age, the calf's own active immunity plays a much greater role in resistance to disease and the effect of maternal colostrum becomes less important.

Interestingly, however, the rate of respiratory infections from d 15-150 were affected by serum IgG concentration. Calves with higher serum IgG concentration at 48 hours had lower rates of respiratory infections. It's possible that colostral IgG protected calves against respiratory infections, especially early in the growing period, when they are most susceptible.

Breeding age showed a trend similar to serum IgG at 48 hours. Calves with highest serum IgG at birth reached breeding weight (407 kg) at an earlier age than other calves. This suggests that higher serum IgG and resulting lower rates of disease results in greater growth rates and earlier breeding than calves with FPT.

References

Furman-Fratczak, K., A. Rzasa, and T. Stefaniak. 2011. The influence of colostral immunoglobulin concentration in heifer calves' serum on their health and growth. J. Dairy Sci. 94 :5536–5543.

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