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Calf Note #67 – An update on colostral IgG

Introduction

Numerous Calf Notes have considered the on-farm management of bovine colostrum. It should be clear by now that an adequate amount of high quality colostrum is essential to the survival, health and growth of young dairy calves. Some recent data contributes to the ever growing body of data related to colostrum quality.

Colostrometer, colostrum yield and IgG

A study conducted by Jardon et al. (1) measured colostrum IgG concentration from 150 Holstein cows using a radial immunodiffusion assay. This value was compared to the reading taken using a colostrometer (for more information on colostrometer, see Calf Note #22 - Using the colostrometer to measure colostrum quality). The yield of colostrum was also determined and correlated to the amount of IgG/L of colostrum.

In this study, there was no correlation between the yield of colostrum and the IgG content. This does not support previous findings of a relationship between yield and IgG content (see Calf Note #38 - The "18 pound rule" of colostrum feeding for more information). The average colostrum quality was 25 g of IgG/L for first lactation cows, 37 g of IgG/L for second lactation cows 47 g of IgG/L for third and later lactation cows. Clearly, there was a relationship between parity and quality of colostrum in this study.

The researchers also found a correlation between specific gravity (measured by the colostrometer) and colostral IgG. The r^2 (a measurement of the closeness of the relationship) was 0.53, meaning that about one-half of the variation in colostrum specific gravity was due to colostral IgG content. (NOTE on r^2 statistics: a perfect relationship between specific gravity and colostral IgG would give an r^2 of 1.0, and no relationship would give an r^2 of 0.0).

Jardon and coworkers concluded that the colostrometer can be used in colostrum management programs to eliminate colostrum that is poor quality (floats in the red zone on the colostrometer).

Test for transfer of IgG

A second group of researchers evaluated on-farm methods to estimate the amount of IgG in blood of calves fed different amounts of colostrum (2). Kliks and coworkers evaluated total protein (TP), sodium sulphite (SST), zinc sulfate turbidity (ZST) and bromocresol green (BG) in 37 calves that died during the first 21 d of birth and from 249 calves that survived. The researchers evaluated the risk of death and ranked the four methods to provide an accurate assessment of the risk that a calf would die. The rankings (best to worst estimator of mortality) was ZST (95%), BG (72%), TP

(66%), and SST (59%). These findings are logical when the nature of the measurement is considered. If we assume that the level of IgG is the best measure of the risk (lower IgG means more risk of death), then tests that more directly measure IgG would be better. The ZST test measures globulins directly and, if accurately measured, can give a good indication of the amount of IgG in the blood. In this study, BG was used in conjunction with TP to measure total globulin also. However, the BG test also used a second measurement (TP), which would add error to the test. Total protein also measures other blood proteins such as albumin, so although it is a reasonable estimate, it did not fare as well in this study. Serum sulphite also measures globulins, but in this study, the data were not as accurate as other methods.

Regularly measuring transfer of passive immunity is a good idea on any farm. These data can help veterinarians and other dairy professionals to better refine the methods used to make those measurements.

References

1. Jardon, P. W., J. D. Robison, and J. Myake. 1999. Evaluation of specific gravity as a screening test for colostrum. J. Dairy Sci. 82(Suppl. 1): 58 (Abstr.).

2. Kliks, R., W. Deptula, W. Jarmuz, and R. Skrzpek. 1999. Appraisal of four methods for evaluation of colostral immunity of calves. J. Dairy Sci. 82(Suppl. 1): 59 (Abstr.).

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