

Evaluation of Beef Cow Colostrum with a Refractometer

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Garland Dahlke, Iowa Beef Center, Iowa State University
Devin Jakob, Graduate Student, University of Nebraska

Summary and Implications

The use of a handheld refractometer measuring percent Brix can be used to provide an estimate of colostrum quality in beef cows as it does in dairy cows.

Introduction

The value of colostrum is well documented and measurements to evaluate the colostrum quality have been widely discussed. Most of this work involved dairy cattle due to convenience, but colostrum is equally important in beef cattle and an assessment of quality is valuable when there are delays in the cow accepting the calf or when health issues begin to occur at a higher frequency in new born calves. Although it was expected that dairy cow and beef cow colostrum should have similar properties, the large difference in the volume of colostrum produced between dairy and beef breeds did motivate an inquiry.

Materials and Methods

Colostrum samples were collected from 46, September calving, mature, Angus cows at the Iowa State University McNay Research Farm immediately after calving to within 18 hours after calving. Samples were split in to two samples and froze. After the last sample was collected one set of the samples was sent to the Cornell University Animal Health and Diagnostic Center which reported the concentration of Immunoglobulin G (IgG), true protein concentration and milk urea nitrogen in each sample. The matching set of samples, which was retained, was allowed to thaw and warm to room temperature (approximately 22 degrees Celsius). Each sample was then mixed and one ml was taken from the sample and placed on the lens of the VEE GEE BTX-1 hand held, optical refractometer (Figure 1) to observe the percent Brix. The percent Brix and the IgG concentration were then paired and evaluated.

Results and Discussion

Table 1 provides a summary of what was measured and Table 2 provides the correlations between these measures. Figure 2 illustrates the relationship observed between IgG and percent Brix. It did appear that the relationship was not linear and followed the polynomial equation shown in Figure 2. The refractometer used was calibrated to 35 percent Brix and this may have been a factor into why we observed the polynomial relationship between percent Brix and IgG concentrations rather than linear as others have reported since there were at least four samples that were greater than 35% Brix.

There was a strong positive correlation between the percent Brix and the IgG concentration (0.80) as others have mentioned from past research thus confirming what we have found. The Cornell lab mentions in their report that the reference interval for IgG in a dult cattle is 1700-2700 mg/dL. The expected value for IgG in calves receiving a dequate colostrum is 1200 mg/dL or greater. Values from a J. of Dairy Science paper (93:3713) indicate that concentrations from 20 to 100+ g/L are common and that high-quality colostrum will be 50 g of IgG/L or better. The IgG values we received were in this range with most being above 50 g of IgG/L. There were a number of low concentrations that were a function of delayed sampling however.

If 50 g of IgG/L (5000 mg/dl) is a dequate, this would correspond with a value of 16% Brix with the data presented here. This is a significantly lower percent Brix than what the J. of Dairy Science article would indicate where they state that a reading of 22% Brix corresponded to the IgG level of 5000 mg/dl.

The lab also provided milk urea nitrogen (MUN) and total protein for each sample as well. Total protein and IgG concentrations were strongly correlated (0.89) as might be expected, but it was interesting that there was a mild negative correlation between percent Brix and MUN (-0.24).

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Figure 1. VEE GEE BTX-1 handheld refractometer.

Table 1. Summary of colostrum.

	% Brix	IgG mg/dl	True Milk Protein g/dl	Milk Urea Nitrogen mg/dl
Average	21.5	6593	14.7	13.6
St. Deviation	7.8	2348	6.2	3.5
Minimum	10	619	3.2	9
Maximum	36	9628	27.3	23

Table 2. Correlations between colostrum results.

	Total Protein	IgG	Milk Urea Nitrogen
% Brix	0.72	0.80	-0.29
Total Protein		0.89	-0.24

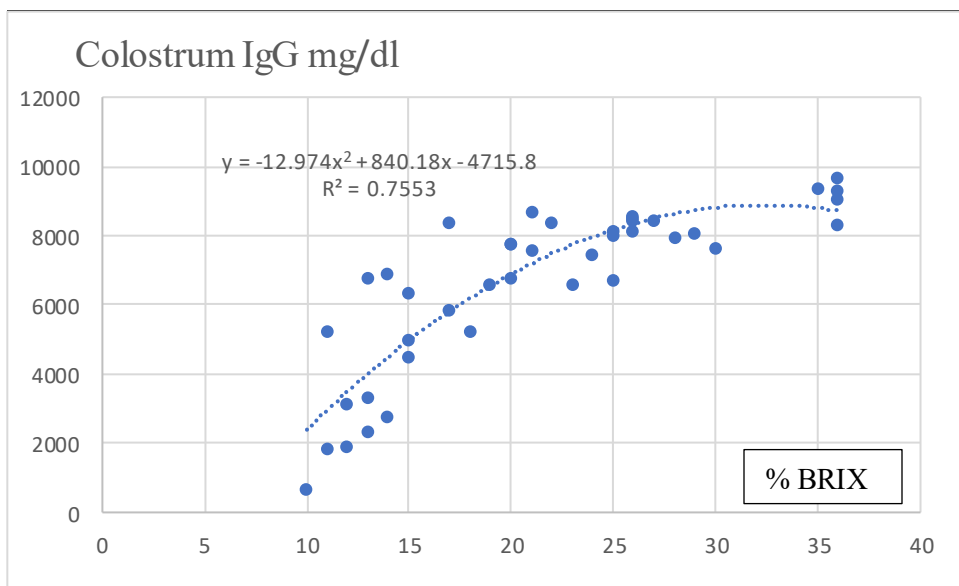


Figure 2. Relationship between colostrum IgG and percent Brix.