

Evaluation of Specific Gravity as a Screening Test for Colostrum

Phillip W. Jardon, DVM, MS, MPVM

*University of California-Davis, Veterinary Medicine Teaching and Research Center
18830 Road 112, Tulare, California 93274*

Jon Robison, PhD, Jacqueline Myake

*Department of Animal Science and Agriculture Education, California State University-Fresno
2415 E. San Ramon Avenue, Mail Stop # 75, Fresno, California 93740-8033*

Abstract

The objective of this study was to determine the usefulness of specific gravity (colostrometer) in the field evaluation of colostrum quality. Colostrum samples (n=150) were collected during the summer of 1997 from 4 dairies in Fresno County, California. Information gathered on each sample at harvest included dam ID, lactation number, yield in kg, hours since calving, colostrometer reading, color, and subjective assessment of thickness. Samples were frozen for further analysis. A 250 ml sample was thawed and hydrometer readings taken to the nearest 0.0005 units at three different temperatures (0-1 °C in an ice bath, 20 °C in a constant temperature bath, and 37 °C in a constant temperature bath). Each sample was analyzed for IgG using VMRD, Inc SRID Kits.

The yield of colostrum harvested had no correlation with IgG content indicating that yield should not be used to evaluate colostrum quality. First lactation colostrum (mean=25 mg/ml, SD=11, n=38) was lower in IgG than second (37 mg/ml, SD=15, n=48), or third and greater (mean=47, SD=22, n=64) lactation colostrum (p<0.01). There was also a difference in IgG concentration between dairies. One dairy collected colostrum only one time per day. They recorded the time of calving allowing us to determine if time from calving to colostrum harvest affected colostrum quality. Colostrum harvested from 0 to 12 hours after calving had more IgG than colostrum harvested 12 to 24 hours after calving (45 and 35 mg/ml respectively, p < .05).

Specific gravity was positively correlated to IgG content. $\text{IgG (mg/ml)} = \text{Specific Gravity} * 1398 - 1430$ R squared = 0.53. This is slightly different from previously reported studies but the same concept still holds true—denser colostrum is more likely to have more IgG. The cow side test using the colostrometer had a sensitivity of 87% and a specificity of 48%. The colostrometer had a sensitivity of 61% and a specificity of 91% on

thawed room temperature colostrum. Sensitivity is defined as the percent of the low SRID IgG colostrum samples that tested low by the colostrometer. Specificity is defined as the percent of high SRID IgG colostrum samples that tested high with the colostrometer. The cut-off point between high and low IgG was set at 50 mg/ml. The average decrease in specific gravity from the ice bath to room temperature and from room temperature to 37 degrees C was 0.006 and 0.004, respectively.

Some Take Home Messages

- Based on our findings the colostrometer can be a useful tool for screening colostrum samples if done carefully and not over-interpreted. The colostrometer is very good at detecting very poor colostrum that can then be avoided in feeding newborn calves.
- Heifer colostrum on average is of poorer quality than cow colostrum but some heifers will have better colostrum than some cows.
- There is no correlation between colostrum yield and IgG concentration so yield should not be used as a screening test for colostrum.
- The difference in specific gravity between cold colostrum (or cow temperature colostrum) and room temperature colostrum is about half of the yellow borderline area on the colostrometer.
- Immediately after harvest, colostrum contains small air bubbles introduced during milking. By testing the colostrum before these air bubbles have had a chance to escape many samples will be falsely classified as poor because the air causes the specific gravity to decrease.
- Time to harvest after calving has a significant effect on colostrum quality. The longer harvest is delayed the lower the IgG content of the colostrum will be. In effect, high quality colostrum will be diluted when harvesting is delayed.