Estimate of colostral immunoglobulin G concentration using refractometry without or with caprylic acid fractionation

Submitted by Dan Van Arsdall on Thu, Jul 12 @ 1pm

Our objectives were to evaluate the use of refractometry as a means of estimating immunoglobulin G (IgG) concentration of bovine maternal colostrum (MC) and determine if fractionation of MC using caprylic acid (CA) improved estimates of IgG. Samples (n = 85) of MC were collected from a single dairy in California and used to determine the method of CA fraction that produced the best prediction of IgG based on CA fractionation followed by refractometry. Subsequently, samples of MC (n = 827) were collected from 67 farms in 12 states to compare refractometry with or without CA fractionation as methods to estimate IgG concentration. Samples were collected from the feeding pool and consisted of fresh (n = 196), previously frozen (n = 479), or refrigerated (n = 152) MC. Samples were further classified by the number freeze-thaw cycles before analysis. Fractionation with CA was conducted by adding 1 mL of MC to a tube containing 75 μL of CA and 1 mL of 0.06 M acetic acid. The tube was shaken and allowed to react for 1 min. Refractive index of the IgG-rich supernatant (nDf) was determined using a digital refractometer. Whole, nonfractionated MC was analyzed for IgG by radial immunodiffusion (RID) and refractive index (nDw). The relationship between nDf and IgG (r = 0.53; n = 805) was weak, whereas that between nDw and IgG was stronger (r = 0.73; n = 823). Fresh samples analyzed by refractometry that subsequently went through 1 freeze-thaw cycle before RID analysis resulted in the strongest relationship between IgG and nDf or nDw (r = 0.93 and 0.90, respectively). The MC samples collected fresh on the farm but frozen 2 or more times before analysis by refractometry or RID had low correlations between IgG and nDf or nDw (r = 0.09 and 0.01). Samples refrigerated or frozen on the farm before analysis had weaker relationships between RID and nDf or nDw (r = 0.38 to 0.80), regardless of the number of freeze-thaw cycles. Breed and lactation number did not affect the accuracy of either test. These results indicated that refractometry, without or with CA fractionation, was an accurate and rapid method to determine IgG concentration when samples of MC were not previously stored before refractometry and frozen only once before RID analysis.

Sources:

K. M. Morrill ,*1 E. Conrad ,† J. Polo ,‡ A. Lago ,‡2 J. Campbell ,‡ J. Quigley ,†‡3 and H. Tyler †
* Cornell Cooperative Extension, Cornell University, Ithaca, NY14853
† Department of Animal Science, Iowa State University, Ames 50014
‡ APC Inc., Ankeny, IA 50021