

Prediction efficiency by near-infrared spectroscopy of immunoglobulin G in liquid and dried bovine colostrum samples

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Heading: NIRS prediction of IgG in liquid and dried bovine colostrum

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SUMMARY

The objective of this study was to compare the prediction efficiency of IgG concentration in bovine colostrum by NIRS, using liquid and dried (Dry-Extract Spectroscopy for Infrared Reflectance, **DESIR**) samples by transfectance and reflectance modes, respectively. Colostrum samples (157), obtained from 2 commercial Holstein dairy farms, were collected within the first hour after calving and kept at -20 ° C until analysis. After thawing and homogenization, a subsample of 500 mg of liquid colostrum was placed in an aluminum mirror transfectance cell (0.1 mm path length), in duplicate, to collect the spectrum. A glass fiber filter disc was infused with another subsample of 500 mg of colostrum, in duplicate, and dried in a forced-air oven at 60 °C for 20 minutes. The samples were placed in cells for dry samples to collect the spectra. The spectra in the VIS-NIR region (400-2500 nm) were obtained with a NIRSystems 6500 monochromator. Mathematical treatments scatter correction treatments and number of cross-validation groups were tested to obtain prediction equations for both techniques. Reference analysis for IgG content was performed by radial immunodiffusion. The DESIR technique showed a higher variation in the spectral regions associated with water absorption bands, compared with liquid samples. The best equation for transfectance method (liquid samples) obtained a higher coefficient of determination for calibration (0.95 vs 0.94, respectively) and cross validation (0.94 vs 0.91, respectively), and a lower error of cross validation (9.03 vs 11.5, respectively) than the best equation for reflectance method (DESIR samples). In final, both methods showed excellent capacity for quantitative analysis, with residual predictive deviations above 3. It is concluded that, regarding accuracy of prediction and time for obtaining results of IgG from bovine colostrum, NIRS analysis of liquid samples (transfectance) is recommended over dried samples (DESIR technique by reflectance).