Is Brix refractometry an appropriate on-farm tool for measuring the IgG concentration in colostrum of Belgian Blue cows?

Geert Hoflack[1], Pleun A.A. Penterman[2], Geert Vertenten[2], Bart Sustronck[1]

INTRODUCTION

Transfer of passive immunity through the administration of colostrum is essential in bovine neonates as the epitheliochorial placenta of cows is impermeable for immunoglobulins (Ig).

Colostrum quality is mainly determined by its concentration of immunoglobulins.

Bacterial contamination of colostrum can have a negative impact on the intestinal absorption of colostral Ig's.

OBJECTIVE

The aim of the study was to evaluate the quality of colostrum from Belgian Blue cows considering not only the IgG concentration but also the bacterial load of the colostrum.

Additionally, the accuracy of indirect evaluation of the IgG concentration in colostrum of Belgian Blue cows with a digital Brix refractometer was assessed, as this is considered a practical cow-side on-farm tool.

MATERIALS AND METHODS

76 colostrum samples collected immediately after caesarean section on 69 commercial Belgian Blue farms. Colostrum samples were stored at -20°C until further processing.

Direct Ig concentration evaluation: commercial competitive ELISA-test kit (BIO K420, MonoScreen QuantELISA Immunoglobulin Easy, Bio-X Diagnostics S.A., Rochefort, Belgium).

Indirect Ig concentration evaluation: digital Brix refractometer (Milwaukee Refractometer MA871, Milwaukee Instruments Inc., USA).

Total bacterial cell count in samples: Bactoscan automatic bacterial count reader (Bactoscan™ FC+, FOSS, Denmark).

The mean of three consecutive Brix measurements was calculated and used for analysis. The relationship between the IgG concentration and the Brix value of the colostrum samples was investigated with a Pearson's correlation.

Poor quality colostrum criteria: IgG concentrations < 50 g/l or Brix value < 22%, and total bacterial cell count (TBCC) > 100.000 CFU/ml.

Above 85% of the colostrum samples from Belgian Blue cows fulfilled the requirements for high-quality colostrum, suitable for administration to new-born calves. Brix refractometry seems inaccurate for the assessment of colostral IgG concentration in Belgian Blue cow.

To download this paper, scan the QR code!

RESULTS

RESULTS OF BELGIAN BLUE COLOSTRUM QUALITY EVALUATION:

IgG content: average 81,24 ± 24,90 g IgG/L(range: 24,90 - 150,00 g/L),

Brix value: mean 25,27 ± 4,05% (range: 16,77 - 36,40%),

Total bacterial cell count: median 5.500 CFU/ml (range: 4.000 – 390.000 CFU/ml).

A low non-significant negative correlation was found between the IgG concentration and the Brix value of colostrum samples from Belgian Blue cows (rpearson = -0,16; CI95% [-0,38 to 0,07]; p = 0,172) **(Fig. 1)**.

POOR QUALITY COLOSTRUM CRITERIA:

IgG < 50 g IgG/l 8,22%

TBCC > 105 CFU/ml 5,48%

Based on criteria by Goden et al. (2019) -13,7% samples were classified as poor-quality colostrum[1].

FIGURE 1. Relationship between Colostrum Brix % and Colostrum IgG of Belgian Blue cows

$t_{Student}(71 = -1.38, p = 0.172, \hat{r}_{Pearson} = -0.16, CI_{95\%} [-0.38, 0.07], n_{pairs} = 73$
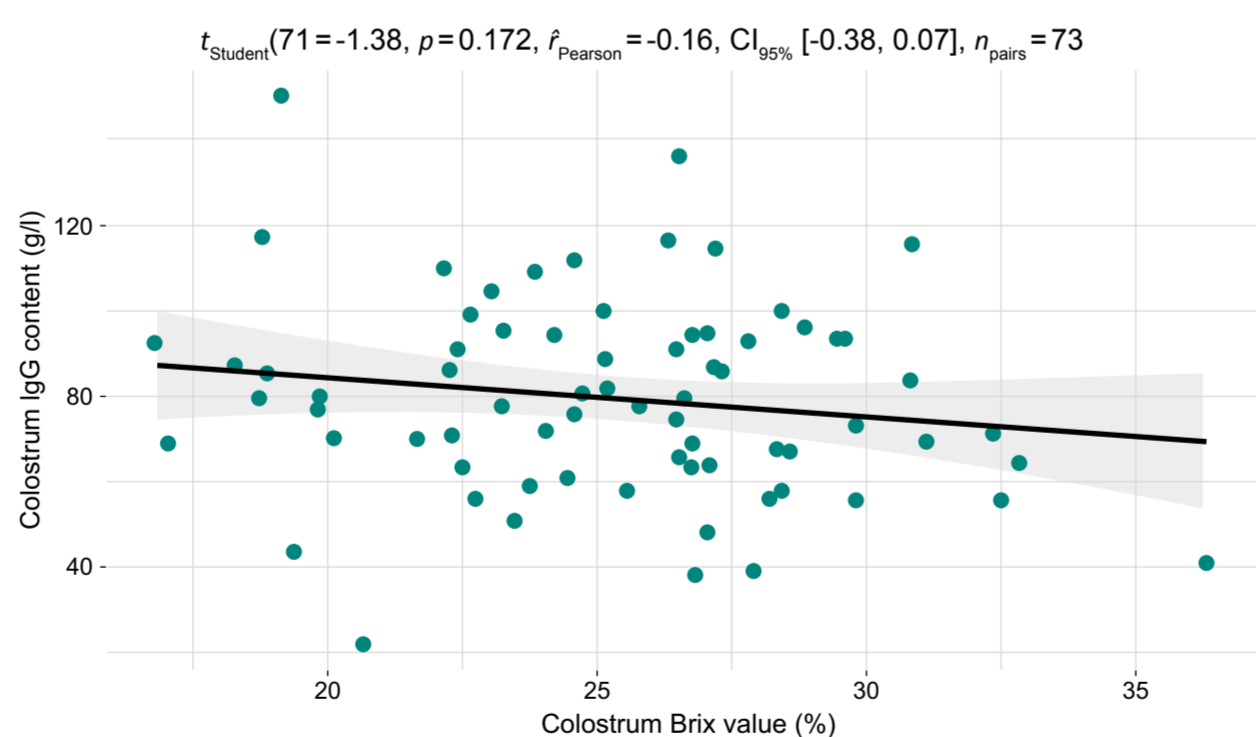

TABLE 1. Proportion of colostrum samples from Belgian Blue cows considered to be of poor quality using established cut-off values for key quality indicators based on Godden et al. 2019[1]

Colostrum quality indicator & cut-off value	Percentage of samples considered to be of poor quality
IgG concentration Cut-off: 50 g/l	8.22%
TBCC Cut-off: 100.000 CFU/ml	5.48%

AUTHORS' AFFILIATION

1. MSD Animal Health, Brussels.
2. MSD Animal Health, Boxmeer.

REFERENCES

1. Godden et al. Vet Clin Food Anim 2019;35:535–556

MSD Animal Health

MSD Animal Health