Colostrum collection using robotic milking systems: impact on immunoglobulin concentration

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INTRODUCTION

- Immunoglobulins cannot cross the epitheliochorial placenta of the cow during gestation; therefore, calves rely on the passive transfer of immunoglobulin G (IgG) through consumption of sufficient amounts of high-quality colostrum within the first hours after birth.
- Robotic milking systems can be used to harvest colostrum using the separation circuit. To our knowledge no studies have been performed to examine the possible impact of this separation circuit on the colostrum quality.

OBJECTIVE

The objective of the current study was to evaluate the possible impact of robotic colostrum harvest on the IgG content of colostrum.

MATERIALS AND METHODS

- A total of 76 paired colostrum samples from 38 HF cows were collected on 3 different farms in the Netherlands.
- From each cow a hand-milked four quarter colostrum sample was collected, discarding the first 4 to 6 squirts of colostrum from each teat, within 2 hours after calving and immediately prior to allowing the cow to the robotic milking system.
- The colostrum of each cow was thereafter harvested in a clean bucket using the separation system of the milking robot. An aliquot of 100 ml was collected from the separation bucket for further analysis.
- To quantify the IgG concentration in colostrum, a commercially available competitive ELISA-test kit (BIO K420, MonoScreen QuantELISA Immunoglobulin Easy, Bio-X Diagnostics S.A., Rochefort, Belgium) was used. Mixed linear regression models, with cow as random effect, were constructed to evaluate the influence of the robotic milking system on the IgG concentration of the colostrum.
- Additionally, the influence of farm on the IgG concentration of colostrum was evaluated.

Robotic milking systems can significantly reduce the IgG concentration in bovine colostrum.

Dilution of the colostrum due to incomplete removal of the flushing fluid in the separation lines of the robotic milking system could be at the base of this observation.

After robotic colostrum harvest, measurement of the IgG concentration (e.g. using Brix refractometry) is recommended to avoid the administration of poor quality colostrum to new-born calves. Ideally, colostrum is hand milked to avoid this probable dilution.

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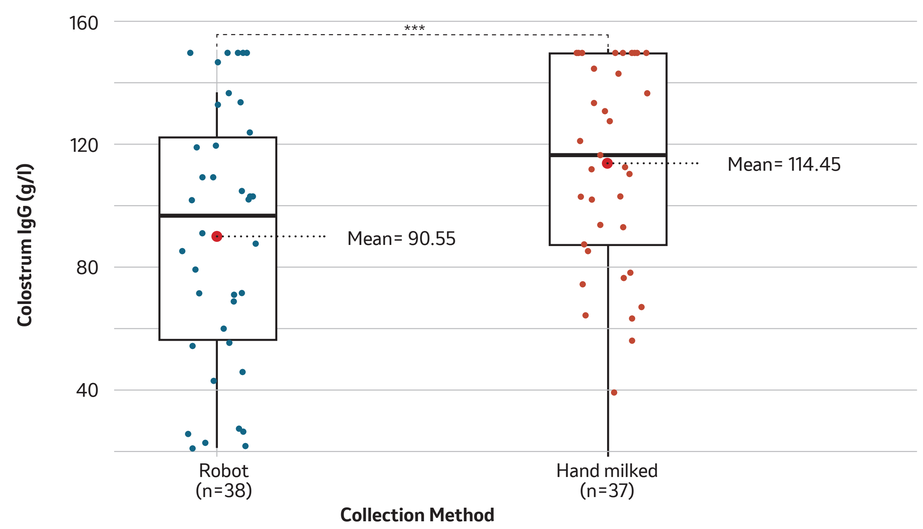
RESULTS

Hand milked colostrum samples had a higher mean IgG concentration than those collected from the separation bucket after robotic milking of the cows **(Fig 1).**

FIGURE 1. Immunoglobin G (IgG) concentration of colostrum using different collection methods

Paired t-Test, t = -4, p < 0.001, n = 38



RESULTS

Colostrum samples collected after hand milking were associated with a significantly higher IgG concentration (g/l) than those collected after robotic milking. No significant influence of farm on colostrum IgG concentration was observed **(Table 1).**

TABLE 1. Mixed linear regression model with colostrum immunoglobulin G concentration (g/l) as outcome.

Parameter	Beta	95% CI[1]	p-value
Collection method			**<0.001**
Robot	ref.		
Hand milked	23.3	11.7, 35.0	
Farm ID			0.2
Farm A	ref.		
Farm B	19.3	-7.09, 45.8	
Farm C	-4.39	-31.5, 22.7	
[1]CI = Confidence Interval			

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Abstract number: 1045. Board number: 111 May 23rd

MSD Animal Health