HERD HEALTH AND PRODUCTION MEDICINE

Colostrum collection using robotic milking systems: impact on microbiological quality

P.A.A. Penterman[1], G. Hoflack[1], N. Botteldoorn[2], G. Vertenten[3], W.A. Schaap[4], L. Gille[1] and B. Sustronck[1]

INTRODUCTION

- The absorption of immunoglobulin G from the colostrum by the calf can be hampered by a high bacterial load of that colostrum.
- Hence, strict hygienic procedures when collecting, storing and feeding colostrum are of paramount importance for a good transfer of passive immunity in bovine neonates.

OBJECTIVE

The aim of the present study was to evaluate whether the use of robotic milking systems for the collection of bovine colostrum could influence the degree of bacterial contamination of bovine 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.
- The total bacterial cell count (TBCC) and total coliform count (TCC) were determined at 22°C using ISO 6222 standard methods.
- Mixed linear regression models, with cow as random effect, were constructed to evaluate the influence of the robotic milking system on the TBCC and TCC of the colostrum.
- Additionally, the influence of farm on both TBCC and TCC of colostrum was evaluated.

The microbiological quality of colostrum is significantly reduced when robotic milking systems are used for colostrum collection.

Insufficient cleaning after passage of the viscous colostrum or mastitis milk in the separation lines of the robotic milking system could be at the base of this observation.

The degree of this negative effect of robotic milking on the microbiological quality of the colostrum is farm dependent.

When using robotic milking to collect colostrum, special attention needs to be paid to hygienic measures (e.g. cleaning and disinfection) to prevent excessive bacterial contamination during colostrum collection. Ideally, colostrum is hand milked to avoid this contamination.

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RESULTS

- Hand milked colostrum samples had a lower mean TBCC and TCC than those collected from the separation bucket after robotic milking of the cows **(Fig 1** and **Fig 2).**

FIGURE 1. Total bacterial cell count (TBCC) in colostrum using different collection methods. Paired t-Test, $t = 14.74$, $p < 0.0001$, $n = 38$

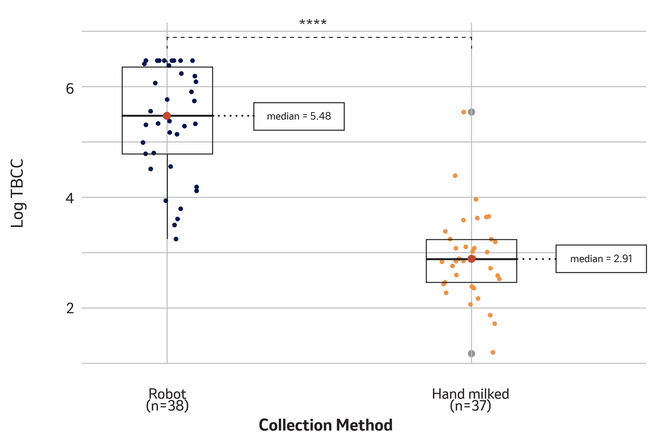
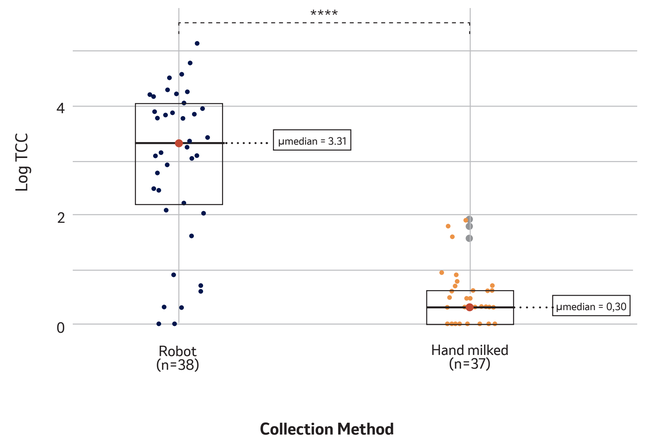


FIGURE 2. Total coliform count (TCC) in colostrum using different collection methods. Paired t-Test, $t(36) = 10.85$, $p < 0.0001$, $n = 38$



RESULTS

- Colostrum samples collected by hand milking were associated with a significantly lower TBCC compared to colostrum samples collected from the separation bucket after robotic milking of the cows **(Table 1).**
- Additionally, colostrum samples collected by hand milking were associated with a significantly lower TCC compared to colostrum samples collected from the separation bucket after robotic milking of the cows **(Table 2).**
- The degree of bacterial contamination, both TBCC and TCC, was significantly associated with the farm on which the samples were collected **(Table 1-2).**

TABLE 1. Mixed linear regression model with colostrum total bacterial cell count (log10) as outcome.

Parameter	Beta	95% CI[1]	p-value
Collection method			**<0.001**
Robot	-	-	
Hand milked	-2.43	-2.73, -2.13	
Farm ID			**<0.001**
Farm A	-	-	
Farm B	0.87	0.51, 1.22	
Farm C	1.51	1.14, 1.88	

[1]CI = Confidence Interval

TABLE 2. Mixed linear regression model with colostrum total coliform count (log10) as outcome.

Parameter	Beta	95% CI[1]	p-value
Collection method			**<0.001**
Robot	-	-	
Hand milked	-2.52	-2.92, -2.12	
Farm ID			**<0.001**
Farm A	-	-	
Farm B	1.18	0.70, 1.66	
Farm C	1.61	1.11, 2.10	

[1]CI = Confidence Interval

AUTHORS' AFFILIATION

1. MSD Animal Health Benelux, Ruminant Business Unit, The Netherlands/Belgium
2. Dierengezondheidszorg Vlaanderen, Belgium
3. MSD Animal Health, Global Ruminant Biologicals, The Netherlands
4. DGC Bekenland, The Netherlands

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