

Can an ATP bioluminescence meter be used as a cow-side tool for the evaluation of bacterial contamination of bovine colostrum?

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INTRODUCTION

Absorption of immunoglobulins from the colostrum by neonatal calves can be hampered by a high bacterial load of the colostrum.

Strict hygienic procedures when collecting, storing and feeding colostrum are of paramount importance.

Adenosine triphosphate (ATP) bioluminescence meter has been advocated as a simple and useful tool for the evaluation of the degree of contamination of surfaces and liquids.

OBJECTIVE

The aim of the study was to examine whether an ATP bioluminescence meter (Fig. 1) can be used as a cow-side tool to assess the degree of contamination of bovine colostrum, and thus indirectly evaluate the hygiene applied during the collection, storage, and administration of colostrum on farms.

MATERIALS AND METHODS

A total of 162 colostrum samples (100ml) were collected from 88 different cattle farms in The Netherlands and Belgium.

All samples were stored at -20°C until processing.

The degree of bacterial contamination (total bacterial cell count) was determined using a Bactoscan™ FC+ (FOSS, Denmark) automatic bacterial count reader.

ATP bioluminescence, expressed as the number of relative light units (RLU) for each colostrum sample, was obtained using a System SURE Plus meter (Hygiena™, California, USA) (Fig.1).

Relationship between the total bacterial count of colostrum and the ATP bioluminescence relative light units of colostrum was investigated with a Spearman's rank correlation. Statistical analysis was performed in R (R Core Team 2017).

ATP bioluminescence measurements of colostrum cannot be used to evaluate the hygiene of the procedures applied during the collection, storage, and administration of bovine colostrum.



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RESULTS

Colostrum samples origin:
HF dairy cows (n= 86)
Belgian Blue beef cows (n= 76).

Median total bacterial cell count of the colostrum samples was 7,000 CFU/ml (4,000 - 1,000,000 CFU/ml).

Median ATP bioluminescence of the colostrum samples was 255,00 RLU (range 1,00 - 2486,67 RLU).

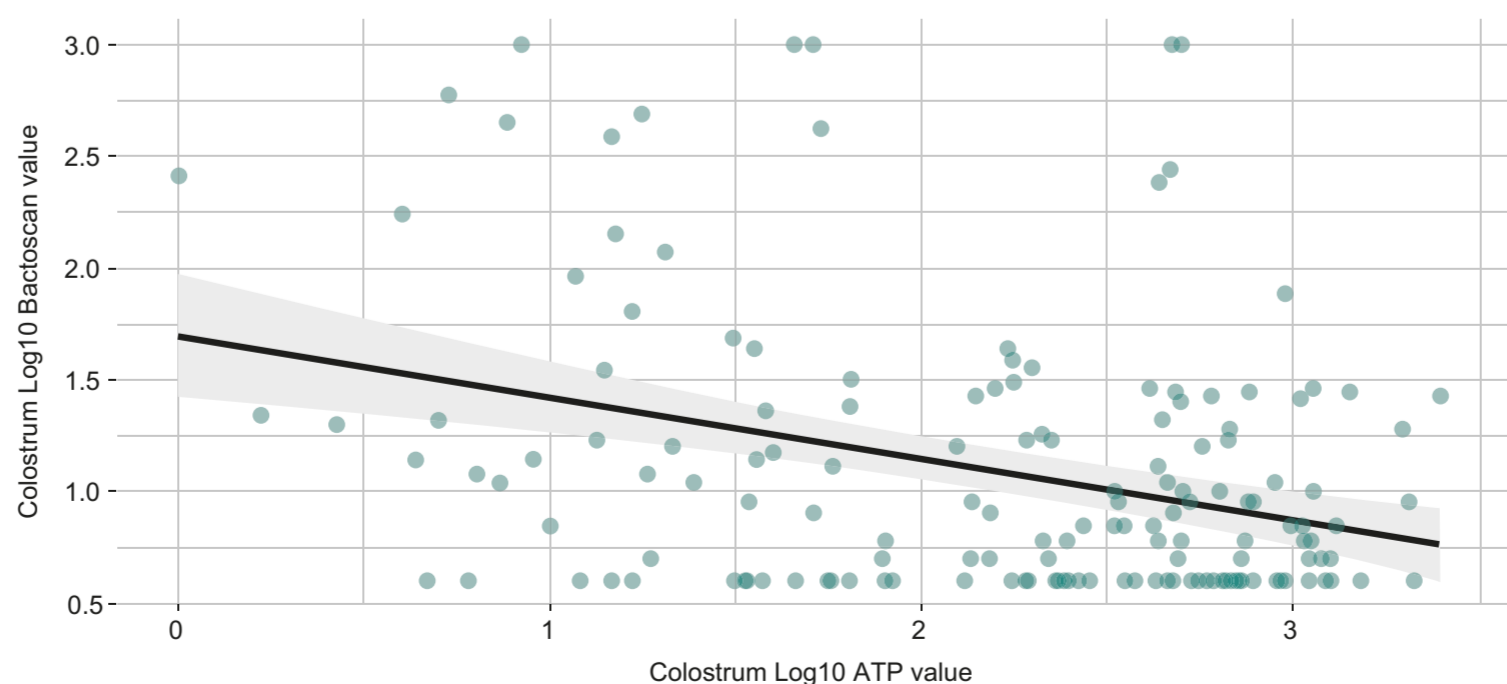
The total bacterial cell count of colostrum and the ATP bioluminescence of colostrum were negatively correlated (ρ spearman = -0,27; CI95% [-0,4 to -0,2]; $p < 0,001$) (Fig.2).

FIGURE 1. ATP bioluminescence meter by Hygiena.



FIGURE 2. Relationship between the total bacterial count and the ATP bioluminescence results of colostrum.

$S = 9e+05$, $p = 6.14e-04$, $\hat{\rho}$ Spearman = -0.27, $CI_{95\%}$ [-0.41, -0.11], $n_{pairs} = 162$



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