

utility are sparse, and nonexistent regarding culling expectations and the associated decision process. Our goal was to identify shared criteria on culling decision held by dairy producers and farm advisors, using a Q-methodological study, which allows for the systematic exploration of subjectivity.

### Materials and Methods

Forty-one dairy producers and 43 advisors (17 veterinarians, 14 feed mill advisors, and 12 DHI advisors) undertook a Q sort with 40 statements that represented a range of viewpoints about cow and herd health, production performances, management issues, and material factors that might impact their culling decision-making process. Sorts were analyzed by-person using factor analysis and oblimin rotation.

### Results

Dairy producers shared a single view on culling, where udder health, milk production performances, milk quota management, and producing a healthy, secure milk were key criteria. Farm management parameters (debts, amortiza-

tion, employees, milking parlor capacity, herd size) were not considered at all. Two profiles were identified among farm advisors. They all used the same key parameters as producers. The first profile – 81% similar to producers – stressed withdrawal period and animal welfare. The second – 56% similar to producers – differed more clearly by considering reproduction status (pregnancy, gestation stage) as key criteria, followed by post-partum diseases and production financial incentives.

### Significance

Our findings suggest that dairy producers and their advisors generally hold a common viewpoint. A subgroup of advisors is using recommendations from economic models where reproduction status is central to farm profitability. Despite outreach programs promoting this approach, it did not reach most of the advisors nor the majority of producers. Understanding and managing these differences is important to assist change management processes required to increase farm profitability.

## Particle-induced x-ray emission analysis of trace and major elements in serum of acute coliform mastitis in cattle

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### Introduction

Acute coliform mastitis (ACM) is 1 of the most frequent causes culling dairy cattle. This condition is typically associated with local inflammation and systemic inflammatory responses as a result of local responses to inflammation. Interleukin-6, interleukin-1, and tumor necrosis factor-alpha play central roles in the production of acute phase responses associated with inflammation and are well characterized. However, knowledge about the biological significance of alterations in trace and major elements associated with production of cytokines during the immune response is limited. Thus, the aim of this study was to investigate the concentrations and relationships between trace and major elements in

serum from dairy cattle with acute coliform mastitis. Receiver operating characteristic (ROC) curves were used to describe the performance of serum in screening for acute coliform mastitis and to propose diagnostic cutoffs for cattle. Further, this data may provide further understanding of trace and major minerals associated clinically with coliform mastitis.

### Materials and Methods

Fifty-three Holstein dairy cattle with ACM were enrolled in this study. The definitive diagnosis of coliform mastitis was made in each animal by culture of *Escherichia coli* and/or *Klebsiella pneumoniae*. Prognosis was divided into animals having good or poor prognosis based upon the

milk production of the cows enrolled in this study. The poor prognosis group was composed of cattle that died within 1 week or were culled due to poor milk production within 30 days after the first medical examination. Thirty-nine healthy, lactating cattle were used as controls. The mean concentrations of trace and major elements in serum were detected by particle induced X-ray emission (PIXE) methods. For normally distributed data, the mean values for each dependent variable were compared among groups, using the Tukey test, after ANOVA with the F test. For non-normally distributed data, the Kruskal-Wallis test was employed for comparison among groups. The ROC curves were used to characterize the sensitivity and specificity of a parameter to poor prognosis. The significance level was set at  $p < 0.05$ .

### Results

Of the 53 dairy cattle with ACM, good and poor prognosis groups were composed in 35 and 18 cattle, respectively. The PIXE method allowed detection of 29 elements. The average concentrations of Fe, Zn, and Br were lower in the ACM than those of the controls ( $p < 0.05$ ), but there were no significant differences in the levels of the remaining eleven elements. The median serum Zn and Br concentrations in control cattle were 1.32  $\mu\text{g/mL}$  and 26.6  $\mu\text{g/mL}$ , respectively. The median Zn (0.90  $\mu\text{g/mL}$ ,  $p < 0.01$ ) and Br (10.4  $\mu\text{g/g}$ ,  $p < 0.01$ ) in serum were significantly lower in ACM compared to control.

The ACM were found to have lower amounts of Fe compared to those without mastitis (1.46  $\mu\text{g/mL}$ ,  $p < 0.01$ ). Serum Fe concentration (0.75  $\mu\text{g/mL}$ ) was significantly lower in dairy cattle with poor prognosis compared to the cows that had longer survival and good production (0.95  $\mu\text{g/mL}$ ,  $p < 0.001$ ). The area under the ROC curves for Fe concentrations was 0.713 ( $p < 0.05$ ). The proposed diagnostic cutoff points for Fe concentrations in serum for identifying poor prognosis of acute coliform mastitis based on the analysis of the ROC curves were set at  $< 0.82 \mu\text{g/mL}$ . Sensitivity and specificity of proposed diagnostic cutoffs for serum Fe concentration was 77.8% and 77.0%, respectively.

### Significance

We found how acute coliform mastitis in dairy cattle is associated with the concentrations of some trace and major elements in serum. The dairy cattle with acute coliform mastitis were found to have lower concentrations of Br, Fe, and Zn in serum compared to those without mastitis. In addition, serum Fe concentration was significantly lower in dairy cattle with poor prognosis compared to good prognosis group. Therefore, the proposed diagnostic cutoffs for serum Fe concentration based on ROC curves analysis in detecting a poor prognosis was set at  $< 0.82 \mu\text{g/mL}$ .

## Detecting endotoxin activity in raw milk using an automated testing system

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### Introduction

Gram-negative bacteria are among the most common environmental pathogens causing mastitis. Endotoxin plays a major role in the pathophysiology of gram-negative bacterial sepsis; therefore, attempts have been made to detect and quantify it, with conflicting findings, in various states of infection. The simple and easy portable test system (PTS) for endotoxin activity offers several advantages over the traditional microplate kinetic limulus amebocyte lysate (LAL)-based test used by diagnostic laboratories. It is small, inexpensive and

portable, requires only small quantities of raw milk, and provides results relatively rapidly in comparison to traditional methods. Thus the portability and ready availability of this cartridge system adds to its attractiveness for use in acute coliform mastitis (ACM). However, since the results obtained using this portable test will often dictate the course of clinical care and hygiene management, it is important that the cartridge system provides accurate information. The aim of the present study was to compare endotoxin activities detected in raw milk samples obtained from healthy dairy cattle without mastitis by a commercially available PTS™ and