

Research Summaries

DAIRY I

Herd Level Indicators for the Prediction of High-Risk Dairy Herds for Subclinical Ketosis

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Introduction

While several tests and surrogate measures have been developed for diagnosing subclinical ketosis at the individual cow level, herd-level indicators to predict which herds might benefit from increased surveillance and enhanced preventive practices could be extremely useful to veterinarians. This project investigated the usefulness of potential herd-level indicators for predicting high-risk herds for subclinical ketosis.

Materials and Methods

Data from 507 Holstein cows representing 25 farms in southwestern Ontario were evaluated. Serum beta-hydroxybutyrate (BHBA) data obtained once weekly for the first two weeks of lactation was used to describe subclinical ketosis, which was defined as a serum BHBA concentration equal to or greater than 1400 $\mu\text{mol/L}$.

For the 25 herds, median prevalence of subclinical ketosis was 20% for each of Weeks 1 and 2, with a mean of 21.5% and 23.5%, respectively, and a range from 0 to 67%. A herd was classified as having a problem with subclinical ketosis if the prevalence was above 20% for either Week 1 or Week 2 post-calving. Herd-level periparturient disease risk rates, body condition score at three weeks prior to calving, and protein-to-fat ratios from first dairy herd improvement (DHI) test post-calving were used to assess criteria for identifying problem herds.

Various cutpoints of disease, using either median or mean disease incidence values, were constructed to compare with the herd classification using serum BHBA. Cutpoints for both protein-to-fat ratio and body condi-

tion score pre-calving were established as well. Two-by-two contingency tables were constructed to screen potential herd predictors. All variables not significant at $p < 0.10$ (Fisher's exact test) were rejected. Sensitivity and specificity of each significant variable were calculated, compared to the gold standard herd classification using beta-hydroxybutyrate.

Results

The variable screening process yielded herd incidence of displaced abomasums, herd protein-to-fat ratio, and herd average body condition score as variables significantly associated with herd-level subclinical ketosis. These variables were further refined to improve practicality on farms.

The following herd cutpoints were established: 1) incidence of displaced abomasums above 5.0% ($p=0.1$); average body condition score at or above 3.5 out of 5.0 ($p=0.07$); and 3) average protein-to-fat ratio at or below 0.78 for first DHI test ($p=0.047$). All were significantly associated with a herd having more than 20% subclinically ketotic cows in the first or the second week post-calving.

Further examination of pre-calving body condition and protein-to-fat ratio revealed that a herd having more than 10% of pre-calving cows with body condition scores of 4.0 or greater was strongly associated with increased probability of being classified as a problem herd ($p=0.001$). This test had a sensitivity of 85% and a specificity of 83%.

If more than 40% of cows in a herd at first DHI test had a protein-to-fat ratio of less than or equal to 0.75, that herd was likely a problem herd for subclinical ketosis ($p=0.01$). This test had a sensitivity of 69% and a specificity of 83%.

Conclusions

Simple parameters—such as herd incidence of displaced abomasums, protein-to-fat ratio, and percentage of fat cows pre-calving—could be used within a practice to predict increased herd risk for subclinical ketosis. These indicators could be useful to practitioners

in determining which herds might need a subclinical ketosis monitoring program. These tests could also be used by veterinarians to target herds which might benefit from enhanced preventive strategies for subclinical ketosis, such as the use of monensin, propylene glycol or rumen-protected choline in the transition cow program.

Does Calthood Infection with *Cryptosporidium* Impact Future Performance of Dairy Heifers?^{a,b}

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Introduction

Cryptosporidium is a zoonotic, parasitic protozoa that is of interest to livestock producers, veterinarians, and public health officials. It is the most prevalent pathogen isolated from diarrheic calves according to published reports. The financial impact of *cryptosporidium* on the performance of dairy herds is unknown. This study sought to determine whether calthood *cryptosporidiosis* has an effect on future performance of dairy heifers.

Materials and Methods

A retrospective cohort study was carried out using fecal samples from calves in 40 herds that were part of a longitudinal study completed three years ago in southeastern New York state. The fecal samples were examined for *Cryptosporidium parvum* oocysts by concentration/flotation microscopy and for *Cryptosporidium*-specific antigen by fecal ELISA. Calves that tested positive for *Cryptosporidium* have a matched, unexposed control based on age and herd. Performance parameters, such as age at first breeding, age at first calving, culling from weaning to first

calving, and mature equivalent first-lactation milk yield, have been captured for both case and control calves from the archival data at DairyOne (NE DHIA) as Dairy Comp 305 files. Exposed cases and controls are compared using time-to-event analysis (survival analysis, PROC PHREG -SAS) and a random-effects, multivariable regression model that controls for confounding factors and herd effect (PROC MIXED -SAS).

Results and Discussion

Sixteen herds met the inclusion criteria for the present study, and their case and control calves were followed up retrospectively through their first lactation. This data will allow us to study whether there is a significant effect of calthood exposure to *Cryptosporidium* on future performance of dairy heifers. For performance parameters where exposure status differed significantly, financial liability will be estimated. While analyzing data only from heifers that remained in the herd from birth through first lactation may introduce some selection bias, a direct measure of the difference in culling between exposed and unexposed groups will allow detection of this effect.

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^bSome results withheld to preserve publication opportunities.