

Association Between Paratuberculosis Milk ELISA Test Result and Milk Production and Breed in Dairy Cows

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Introduction

Paratuberculosis, or Johne's disease (JD), is suspected to decrease the milk production in dairy cows. The objective of the study was to compare the individual cow's milk production on test day between milk-ELISA, JD-test positive and negative cows and to evaluate the relationship between breed and JD milk test results.

Materials and Methods

The study included 80 volunteering herds in Ontario, Canada. In these herds all cows milking were tested for JD on one test day using the AntelBio milk ELISA test. Of the 4,389 cows tested only 23 cows had JD test results in the suspicious range. For further analysis these were included as test-positive animals, which led to an optical density cut point for the milk ELISA of 0.065. The relationship between JD milk test results and milk production on test day was explored using the Proc Mixed procedure in SAS and including only variables with a $P < 0.01$. The final model included breed, lactation number, JD milk test result (positive vs. negative), days in milk (DIM), DIM-squared, somatic cell count (SCC) and SCC-squared (SCC on a log scale) as well as the interactions between breed and lactation number, breed and DIM, lactation number and DIM, lactation number and SCC and lactation number and DIM. The relationship between JD milk test results and breed was explored using the Proc Glimmix procedure in SAS. Ayrshire ($n=8$), Brown Swiss ($n=12$), and Canadian ($n=1$) cows all had negative test results and because of their low numbers were excluded from the analysis. Guernseys ($n=72$) and Jerseys ($n=440$) reacted

statistically comparably; therefore they were combined as "Channel breeds" and compared to Holsteins ($n=3856$). The factors included in the model were herd, breed (Holstein, Channel breeds), lactation number, SCC, DIM and lactation number-squared. The herd of origin was included in both models as a random effect.

Results

Including the 23 suspect cases, 171 cows (3.8%) had positive milk ELISA test results for JD. Thirty-four cows had an optical density test score of 1.0 or greater. None of the cows tested had clinical signs of Paratuberculosis. After accounting for herd, lactation number, breed, days in milk, SCC and the other factors, cows with JD positive test results produced 3.4 kg (CL: 2.4 – 4.3 kg) less milk than test-negative cows ($P < 0.001$) on test day. Cows of the Channel breeds had 3.2 times the odds of testing positive for JD than Holstein cows (CL: OR 1.9 – 5.9; $P < 0.001$).

Significance

Cows with JD positive test results on the milk ELISA had significantly reduced milk production. Additionally, after adjusting for herd, lactation number and DIM, cows of the Channel Breeds were more likely to test positive for JD on the milk ELISA than Holstein cows. This might indicate a differing detection rate of the milk ELISA, a different exposure rate to the disease or a difference in genetic susceptibility among these dairy cow breeds for JD. Further research is warranted to discover why this difference occurs in Ontario.