Effect of Milk Urea Nitrogen and Nutrition on Reproductive Performance in Commercial Dairy Herds in Prince Edward Island, Canada

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Introduction

The objective of this study was to investigate the impact of nutritional and management factors and milk urea nitrogen levels on reproductive performance in a large number of commercial dairy herds in Prince Edward Island (PEI), Canada.

Materials and Methods

A total of 83 dairy herds in the province of PEI participated in the study. The farms were visited twice and contacted once by telephone between October 1999 and January 2001. At each farm visit, stored feeds were sampled, and were subsequently submitted to the provincial feed testing laboratory to determine their nutritional value. For each herd at each of the three contact times, a detailed questionnaire relating to nutrition and management was completed and a formal ration evaluation was conducted using SPARTAN for three stages of lactation (early, mid and late). All farms were on a monthly milk testing program. Therefore, breeding data from all cows from these farms were gathered electronically from a central database. All first services occurring from 60 days before to 30 days after each nutritional evaluation were used in these analyses. The occurrence and timing of subsequent breedings and calvings were used to determine first service breeding success (FSBS). Milk components and 24 hour milk production data for the herd test closest to the first service date were also gathered from the central database. From our previous work on 186 dairy herds without nutritional data, the log odds of FSBS was decreased after MUN exceeded 15.5 mg/dl. Therefore, MUN values were classified into 2 groups, low (<15.5 mg/dl) and high (≥15.5 mg/dl). Using FSBS as the dependent variable, multivariable, mixed logistic regression was conducted, with herd included as a random effect, to determine significant (p < 0.05) risk factors at the animal and herd levels.

Results

The final dataset included 932 successful first services, and 957 unsuccessful first services, with 358 (15.93%) first services excluded due to an inability to confirm success of the breeding using the established criteria. The high MUN group was associated with a 37% reduction in the odds of conception (b=-0.478) when compared to the low group (P=0.001). With respect to the other variables in the final model, as expected, increasing 24 hour milk yield on the closest test date and increasing parity were also significantly negatively associated with the odds of conception. While energy levels and energy-protein ratios were correlated with crude protein, it was crude protein levels that had the strongest negative association with odds of conception. Type of housing also had a impact on odds of conception. Compared to free-stall housing, tie-stall housing was associated with a significant reduction in the odds of conception.

Significance

Based on the current analyses, MUN levels above 15.5 mg/dl have a detrimental effect on first service breeding success, even after controlling for herd effects and other significant risk factors, including nutritional factors.