

Milk Urea and Protein Concentrations in Milk of Dairy Cows as a Diagnostic Tool: Factors Affecting Analysis and Interpretation

Eicher R., Bouchard E., Bigras-Poulin M., Tremblay A.

Introduction

Milk urea (UREA), together with percentage milk protein (PROT), are increasingly being used as indicators of the protein-energy balance of the ration and for monitoring nutrition or diagnosing feeding disorders. Goals of this study were a) determine the influence of the variations among quarters, the somatic cell count, sample conservation, centrifugation, and the time of sampling during the day on UREA, and to propose a sample collection procedure for herds that are not on a Dairy Herd Improvement (DHI) program; and b) analyze the effects of parity, daily milk yield, days in lactation, somatic-cell count, and herd and feeding factors on UREA and PROT.

Materials, Methods and Results

In the first part, 40 cows from two herds with different feeding practices were randomly selected. The quarter of the udder sampled and the somatic cell count did not significantly influence UREA. The UREA concentrations were significantly higher after refrigeration for 1 week and freezing for 1 month. UREA was slightly higher in lactoserum than in whole milk. Abnormally low values were detected in 2 whole milk samples. UREA was highest in the morning. The diurnal pattern was not influenced by such intrinsic factors as parity, days postpartum, or daily milk yield. Although this study included 2 herds only and does not allow extrapolation, differences were found in the diurnal pattern of UREA

in these 2 herds which possibly reflect differences in feeding strategy.

With consideration of these results, the following sample collection and analysis recommendations can be made for herds that are not on a DHI program: A) Sample in the morning, about 2-3 hours after concentrate feeding, or pool morning and afternoon milk. B) A sample of any clinically healthy quarter is representative. C) Results from samples taken in the afternoon should be corrected. D) In some cases, it could be useful to analyze both morning and afternoon milk to get an indication of the dynamic changes of circulating urea due to inadequate concentrate feeding. E) If UREA is measured in whole milk, any result < 2 mmol/l should be repeated in lactoserum.

In the second part, 1 milk sample was taken from each of 418 cows in 10 dairy herds, within ± 2 days of the routine milk-test visit. We used a 4-step multiple linear-regression model with backward elimination, including interactions between herd and the different factors. For both dependent variables, there were significant interactions with herd. Although herd-specific models were markedly different, the daily amount of protein concentrates fed remained in 7 of 10 herd models for UREA, with all coefficients positive. This factor is easy to record under field conditions, and has to be considered in evaluation of the ration by means of UREA and PROT. The relationships between UREA and PROT on 1 side and the factors parity, daily milk yield, and days postpartum also vary considerably among herds.