Accuracy of a Cow-side Test for Quantification of Blood BHB and Glucose in Lactating Dairy Cows

I. López Helguera[1,2] A. Behrouzi[2], M. Gobikrushanth[3], B. Hoff[4] and M.G. Colazo[2]

[1]Agrotecnio Center, Animal Production Department, University of Lleida, Spain; [2]Livestock Research Branch, Alberta Agriculture and Forestry, Edmonton, AB; [3]Department of Agricultural Food and Nutritional Science, University of Alberta, Edmonton, AB; [4]Animal Health Laboratory, University of Guelph, ON. E-mail: marcos.colazo@gov.ab.ca

In dairy cows, ketosis is diagnosed by measuring blood β-hydroxybutyrate (BHB), and blood glucose (GLU) testing can be used for individual cow treatment decisions. We compared the accuracy of a hand-held meter device (Precision Neo™, Abbott Laboratories) for the quantification of blood BHB and GLU relative to a reference chemical analyzer in a diagnostic laboratory. Blood samples were taken from the coccygeal vessels into vacuum tubes without any preservative. The BHB (n=428) and GLU (n=295) readings performed with the hand-held meter device were taken on the whole blood immediately following collection. Tubes were left at room temperature (3-4 hours) before centrifugation (3,000 × *g* for 20 min). Serum was collected, frozen, and stored at −20°C until submission to the Animal Health Laboratory (University of Guelph) for determination of BHB and GLU concentrations. Values obtained with the cow-side test were compared to the standard laboratory test in order to determine their correlation (PROC CORR, SAS 9.3). The sensitivity (Se; % identified as positive that are truly positive) and specificity (Sp; % identified as negative that are truly negative) of the cow-side test were also calculated. Laboratory BHB and GLU values ranged from 0.2 to 5.1 mmol/L, and 0.7 to 5.3 mg/dL, respectively. The overall correlation for BHB was very strong (r=0.97; *P*<0.001). However, we found a weak correlation (r=0.43; *P*>0.1) for samples with BHB values >3 mmol/L. Using a threshold of serum BHB ≥1.2 mmol/L (cut-off for subclinical and clinical ketosis), the Se and Sp of the cow-side test were 98.3 and 94.8%, respectively. The overall correlation for GLU was moderate to strong (r=0.69; *P*<0.001). When only blood GLU values <2.5 mg/dL (hypoglycemia) were considered, the Pearson correlation coefficient was 0.5 (*P*<0.001). The Se and Sp of the cow-side test were 90.9 and 45.4%, using a threshold of serum GLU <2.5 mgl/dL.

Take Home Message: The Precision Neo meter is excellent at measuring whole blood BHB in cows. However, it overestimates the proportion of cows with low blood GLU, which makes cow treatment decisions inaccurate.

This project was financially supported by Growing Forward 2 (a federal-provincial-territorial initiative) and Alberta Agriculture and Forestry.