RESEARCH FOCUS

By Jessica McArt and Kathryn Bach

Comparison of hand-held meters to diagnose hyperketonemia

Due to the high incidence of early lactation hyperketonemia, on-farm testing is important for monitoring and treatment. Recently, most on-farm testing has been performed using the Precision Xtra meter, a hand-held blood ketone meter originally developed for human use that tests for beta-hydroxybutyrate (BHB). This meter is well validated and much more accurate than urine and milk tests at diagnosing hyperketonemia. However, BHB measurement strips for the Precision Xtra meter are no longer available in the US at previously marketed prices for cows, leaving producers the choice of purchasing strips for $5 each or switching to a new BHB measurement device.

Over the past few years, additional BHB meters were developed for human and veterinary use, including the TaiDoc meter (not yet on the market) and the Nova Max and Nova Vet meters. A recent study by Dr. Kathryn Bach and Dr. Jessica McArt at Cornell University, in collaboration with Dr. Wolfgang Heuwieser at Freie Universität Berlin, evaluated the diagnostic performance of these hand-held meters to provide the dairy industry with additional options for on-farm hyperketonemia diagnosis and monitoring.

The study was conducted on blood samples collected from Holstein cows between 262 days pregnant and 15 days in milk from two freestall dairies in NYS. Accuracy of the TaiDoc, Nova Max, and Nova Vet meters, in addition to the Precision Xtra, was assessed against gold standard laboratory determined BHB. In addition, the precision (i.e., repeatability) of each meter was evaluated by measuring the same sample 10 times per meter. Blood BHB of the tested samples ranged from 0.3 to 7.9 mmol/L according to gold standard laboratory measurement.

The Precision Xtra, TaiDoc, and Nova Vet meters all performed well during this study. Agreement between the meter and the gold

> **Use blood ketone testing to improve monitoring of fresh cow health and management.**

standard laboratory was best for the Nova Vet meter, with a clinically negligible average difference in reading of 0.08 mmol/L, which would not affect classification of hyperketonemia. The TaiDoc and Precision Xtra meters, on average, read slightly high with an average difference of 0.21 and 0.34 mmol/L, respectively. The bias seen with these two meters would result in a few additional animals being misclassified. However, in a herd monitoring scheme, these numbers would be minimal and adjustment to a cut point of 1.4 mmol/L would correct for some of this misclassification. The Nova Max meter had the worst agreement with the gold standard laboratory, consistently reading lower than the true BHB concentration. Precision was acceptable for all meters, based on human clinical standards, although repeatability for the Nova Max was more marginal than the other three meters.

The Nova Max was developed for use with human blood, which has a different ratio of red blood cells to total blood volume, compared to cow blood. The Nova Vet meter adjusts for this difference with a recommended slope correction of 1.25 when evaluating bovine blood. This calibration needs to be performed once on each Nova Vet meter after purchase and is imperative to its appropriate function in dairy cattle.

The Nova Vet and TaiDoc meters are acceptable alternatives to the Precision Xtra for on-farm BHB analysis. The low sensitivity of the Nova Max meter and its marginal repeatability should exclude it from use as a tool for hyperketonemia testing in dairy cows. ❑

Kathryn D. Bach (kdb23@cornell.edu) is a graduate student in the field of Animal Science at Cornell University. Jessica A. A. McArt (jmcart@cornell.edu) is an Assistant Professor of Ambulatory and Production Medicine in the College of Veterinary Medicine at Cornell University.