Metabolic Profile Testing in Transition Cows

By Mike Messman

More and more frequently we are presented with information on the profile of blood constituents of cows and asked to interpret what the data points are telling us. Some of the common blood measures are Blood Glucose (BG), Non-Esterified Fatty Acids (NEFA), and β-Hydroxy Butyric Acid (BHBA). Why are these measures taken? All three are indicators of what the transition cow is doing with her body reserves of energy.

What are the tests and how should you interpret them?

Energy status can be predicted from BG, NEFA, and BHBA. Blood glucose is a difficult measure to monitor because the cow works very hard to control blood glucose. The idea is that low blood glucose is an indication of inadequate propionate supply from the rumen or poor conversion of propionate to glucose by the liver. Either way it is telling the animal that energy is in short supply and that body weight needs to be mobilized. Blood glucose is not the best measure to diagnose transition cow energy status because it just does not vary a lot, making it difficult to relate back to problems.

Fat mobilization and efficiency of use of mobilized fat is evaluated by monitoring NEFA and BHBA. Mobilization of fat shows up in NEFA typically in a range between 0.1 and 0.8 mEq/L. NEFA levels below 0.3 mEq/L are a good goal, but NEFA alone does not tell the whole story. For that we need to know the efficiency of use of mobilized NEFA. This requires looking at BHBA in conjunction with NEFA levels. Levels of BHBA usually run between 300 and 900 µmol/L. Levels of BHBA less than 475 µmol/L indicate that mobilized body fat is being used efficiently. It is important to get both NEFA and BHBA because a NEFA of 0.4 mEq/L with a BHBA of 470 µmol/L is probably not a problem for the cow. She is using body fat to support milk production. However, a NEFA of 0.4 mEq/L with a BHBA of 750 µmol/L is an indication of a problem with efficiency of use of mobilized fat and also an indicator that ketosis and fatty liver could be a problem.

What are the sampling procedures?

There are some precautions we need to take when looking at these blood parameters. If using these measures to monitor the transition period we need to
randomly sample 5 to 15 cows in the close-up group and that same number in the fresh group once per week. Sample numbers should be at the low end for small groups and at the high end for larger groups. Pull the samples the same time of day to help eliminate variation from daily management patterns. Blood samples must to be handled properly. They need to be centrifuged within ~3 hours of the samples being pulled to ensure high quality serum samples for the lab assay. This means you need to plan ahead on what lab the samples are going to and how best to get them to the lab.

**Prevention versus Diagnosis**

If possible we need to use these measures as a preventative tool rather than a diagnostic tool. We need to monitor NEFA and BHBA over time and get a herd specific base line developed, set tolerances that we think are between the normal limits for that herd and when we observe that NEFA or BHBA are out of tolerance we need to act to prevent cow problems. This action must include identifying why the nonconformance occurred and correct the underlying problem.

**Summary**

Sometimes blood tests get a bad reputation and I think that comes more from the approach of walking into a herd and running a bunch of tests to see what falls out versus using blood tests as a system monitoring tool.