Collecting Blood to Perform Metabolic Profiling

TEXAS A&M TVMDL VETERINARY MEDICAL DIAGNOSTIC LABORATORY

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Metabolic profiles are used in dairy cattle to help identify nutrition and management challenges. In addition, these profiles are used to assess animals that are clinically healthy, but are not meeting milk production potential or reproductive efficiency.

A representative number of animals from each stage of lactation should be sampled and the mean values for each analyte are determined for each lactation stage group and compared to reference means established by the Texas A&M Veterinary Medical Diagnostic Laboratory (TVMDL). The reference values are derived from healthy dairy cattle reaching expected production potentials. The means for each analyte should be within one standard deviation (SD) of the reference mean.

Metabolic profiles in dairy cows are used for two general reasons. The first is to assess the nutritional status of healthy cows performing at an acceptable level in an attempt to identify and thereby recognize any nutritional problems before they surface as a production or health related issue. The second reason is to identify or eliminate potential nutritional issues in cows or herds with poor performance records, i.e., high incidence of transition problems, low milk production, poor pregnancy rates, etc.

A high prevalence of calving-associated diseases may be associated with overall nutrition (net energy and/or mineral deficits). Some problems may not be diagnosable from a metabolic profile alone; therefore it may be necessary to add other tests such as vitamin A and E, trace minerals, or routine chemistry panels.

The metabolic profile measures glucose, urea, albumin, cholesterol, beta-hydroxybutyrate (BHBA) and non-esterified fatty acids (NEFA) as well as some minerals (Na, K, Cl, Ca, Mg, P). These parameters can help assess total protein and energy intake, the balance between protein and energy, and the net energy balance. Utilizing a metabolic profile also allows screening for production limiting nutrients.

In order to help assure specimen quality on samples submitted for metabolic profiling, TVMDL is making available a fact sheet with information on metabolic profiling and the best procedure to collect and submit samples for the analysis. Following these procedures will significantly decrease the chance of unreliable results. Providing reliable results will make it easier for dairy veterinarians and nutritionists to more accurately interpret results, identify and eliminate any potential nutritional problems affecting a herd. TVMDL's Amarillo laboratory offers the metabolic profile as a routine diagnostic service as well as other tests that can be added as needed.

Tips on Collecting Blood Samples for Metabolic and Mineral Profiles

It is essential to collect blood and harvest serum appropriately and in a timely manner to avoid sample hemolysis and artifactual results.

Equipment

- 16-20 gauge sterile disposable collection needle
- Plastic needle holder or 10cc syringe
- Red top collection tubes

Methods

- Clean the bleeding site before collecting the blood. Draw blood from the external jugular vein or from the coccygeal (tail) vein. Collect blood into a red top tube (plain tube) by puncture of the external jugular vein or the tail vein using a 16 - 20 gauge sterile disposable collection needle and a plastic needle holder. If using a syringe to collect the blood, place the blood into a red top tube immediately after blood collection.
- After blood is collected, set the samples aside at room temperature out of direct sunlight for 30 to 60 minutes to allow formation of the clot then spin as soon as possible. A significant delay in harvesting the serum from the clots results in falsely elevated serum potassium and magnesium (released from red blood cells). It will also increase phosphorous, potassium, albumin and magnesium levels. In addition, hemolysis causes a misleading low blood glucose. Finally, hemolysis may contribute to unreliable NEFA and BHBA results. If possible, spin the blood samples within 2-4 hours, harvest the serum and store at -20°C (-4°F) until shipment. **Serum is the required specimen** for metabolic profiling and most of the trace mineral and vitamin testing. Refrigerate blood samples by placing them in the refrigerator or by wrapping the tube with a paper towel and then placing in a cooler with ice or ice packs.

Contact TVMDL Amarillo at 888.646.5624, or your veterinarian with questions.