IOWA STATE UNIVERSITY
Extension and Outreach

Sample Collection and Handling for Vitamin and Mineral Analyses

Biological Sample Collection and Storage Issues

When there is a nutritionally relevant issue on a farm and biological samples need to be sent to the diagnostic laboratory, it is common to send the samples in the mail overnight.

Collecting samples

Biological sample collection should occur immediately postmortem to help ensure accurate analysis of the sample. If samples are not collected immediately, the possibility of degradation increases. Thus, after samples are collected, they should be frozen without delay and remain frozen until analysis in the laboratory. If an animal dies overnight, it may be tempting to take samples when the animal is found in the morning. However, while this animal will be posted for any disease potential, any samples for nutrient assessment may not be reliable because the time of death is unknown. Degradation of any organic material in the sample may have occurred for an unknown period.

Degradation concerns

Organic materials, such as vitamins and amino acids, are carbon-based and will degrade over time. Most analyses are conducted for organic compounds, so it is important to prevent as much degradation as possible. Also, different organic compounds will degrade at different rates, so freezing biological samples as quickly as possible is essential.

Mailing samples to the diagnostic laboratory

To preserve the tissue as it was within the animal, tissue samples should be frozen from the time they are collected through arrival at a diagnostic laboratory. Blood that will be transported should be centrifuged to separate the red blood cells from the serum/plasma as soon as possible after collection. However, centrifugation may not be possible due to equipment limitations at the livestock facility.

Due to the high cost of shipping samples on dry ice, most veterinarians utilize ice packs to keep the samples refrigerated and will send samples (tissue and blood) via overnight mail. This helps prevent the degradation of nutrients in a refrigerated state sample when the ideal frozen sample state is not possible (Figure 1).

Additionally, the temperature within the package may vary depending on the number of ice packs placed inside the cooler and the relative outside temperature. Delivery delays to the diagnostic laboratory can occur anytime when weather disturbances occur, meaning samples could arrive 24 to 72 hours after the intended arrival time. Little is known to what extent this delay may affect vitamin and mineral degradation, impacting diagnostic findings. However, if there is a delay in sample analysis, data supports that vitamin A and E levels will be preserved[1].

Summary

Mailing samples to a diagnostic laboratory is a common practice. To prevent degradation of tissue samples, keep samples frozen. For blood samples, remove red blood cells from the serum/plasma and keep the serum/plasma frozen. If a delay occurs when mailing samples, use caution when interperpting results from analyses.

Figure 1. Two biological samples in a cooler with ice packs.

See more information on blood samples in Iowa State University Extension and Outreach publication IPIC 205A: Sample Collection and Handling for Vitamin and Mineral Analyses: Collecting Feed and Biological Samples for Vitamin and Mineral Testing. https://store.extension.iastate.edu/Product/16573.

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Resources

[1]Elefson S, Greiner L. Effects of biological sample preanalytical manipulation for fat-soluble vitamin analysis. Unpublished.