

## Sample Collection and Handling for Vitamin and Mineral Analyses

# Collecting Feed and Biological Samples for Vitamin and Mineral Testing

If concern arises about a possible nutritional deficiency or toxicity in a swine diet, a feed or biological sample can help identify the issue. Since neither feed nor biological tissues are fully homogenous in character, the source of the sample must be accurately portrayed. This means it is imperative to take a suitable and representative sample that accurately represents the parameter of interest and its source.

### Feed samples

A dietary analysis of the quantities and quality of amino acids, fats, vitamins, and minerals in a feed sample can provide information on possible deficiencies, toxicities, or competition for absorption among nutrients that otherwise are unaccounted for in the diet.

#### **Collection of feed samples**

Feed is not homogenous, and it is likely larger particles have separated during transportation. Also, feed that's next to the edge of a bin or near the top of the bin may be more oxidized than feed in the middle of the feeder. That's why it is best to collect a feed sample from the mixer or from the center of the feeder used by the animals in question.

#### **Determining number of feed samples**

Obtaining multiple subsamples either from a variety of locations in the feed bin or during the time of mixing is ideal. This approach can help account for variability that may be present in the feed. However, some circumstances make this impossible. In these instances, one large sample from a feed bin can be used.

#### **Storage of collected feed samples**

Feed samples should be kept in a cool, dry location out of direct sunlight<sup>1</sup>. If allowed to remain in sunlight, for example, vitamin potency will be degraded resulting in an incorrect analysis of the feed's vitamin status. In all cases, consult with the diagnostic laboratory for proper storage procedures of all feed samples.

### Biological samples

A blood sample can be used to assess certain nutrients; however, not all deficiencies and toxicities may be detected in the serum. Because the liver may sacrifice some of its stores to regulate

vitamins and minerals in circulation in the body, a liver sample can provide insight into what is occurring in the animal. A muscle sample might be considered to assess levels and status of some vitamins and minerals. See more information on blood samples in Iowa State University Extension and Outreach publication IPIC205b: Blood Sample Collection for Nutrient Analysis, [extension.iastate.edu/WhateverThePubInfol.s](https://extension.iastate.edu/WhateverThePubInfol.s).

#### **Tissue sampling**

Individual vitamins and minerals may be stored in different tissues. Contact the diagnostic laboratory where the samples will be analyzed for information on which tissues and how much of each tissue is needed. Know the specific sampling location of each tissue so representative results can be obtained for comparison to reference values available to the lab.

#### **Composition of biological sample**

If not possible to determine how much tissue is needed prior to collection, collect a tissue sample size of up to 4 inches by 4 inches. For blood testing, collect at least 5 ml. of serum.

Storage of collected biological samples. If a biological sample is left at room temperature after collection, some nutrients may start to degrade. This degradation can result in inaccurate analysis results. By keeping the samples frozen, the degradation rate is slowed. However, all samples should be submitted to a diagnostic laboratory as soon as possible after collection.

### Questions to Ask the Diagnostic Laboratory

Is there a specific amount of feed needed for analysis?

Which tissues should be collected?

How much sample is needed?

What is the best way to store samples before submitting to a diagnostic laboratory?

Sample storage is also addressed in Iowa State University Extension and Outreach publication IPIC205C: [Sample Collection and Handling for Vitamin and Mineral Analyses: Biological Sample Collection and Storage Issues](https://store.extension.iastate.edu/Product/16575). <https://store.extension.iastate.edu/Product/16575>.

## Summary

A nutritional deficiency or toxicity can be identified via feed or biological samples. However, a proper sample collection and storage process is imperative for an analysis to yield accurate results. Communication with the diagnostic laboratory prior to collection can help ensure an appropriate sample is taken and stored, so any issues can be identified and solved quickly.

## Authors

Sarah Elefson, graduate student in animal science, Iowa State University; and Laura Greiner, assistant professor of animal science, Iowa State University.

## Resources

New M. Feed and feeding of fish and shrimp: a manual on the preparation and presentation of compound feeds for shrimp and fish in aquaculture. Food and Agriculture Organization of the United Nations. Rome; 1987.