

DAIRY WASTE SAMPLING GUIDELINES

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The NCDA&CS Agronomic Division's Plant/Waste/Solution Section analyzes about 800 dairy waste samples per year. This service is provided at a reasonable cost with quick (two working day turnaround) and reliable results. Waste analysis measures levels of essential plant nutrients—nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, zinc, copper and boron.

Plant-available nutrients are calculated based on the application method and waste code indicated on the sample information form. Appropriate codes for dairy waste are LSD (liquid slurry), SSD (surface-scraped or stockpiled), FCD (composted waste), ALD (anaerobic lagoon liquid), and ASD (anaerobic sludge). Proper waste codes, sampling technique and sample shipping/handling are imperative for reliable results and recommendations.

Types of Waste

Liquid slurry (LSD) — the mixture of liquid and solid waste from a manure storage basin, which averages 5–10% total solids. About 56% of dairy samples received are coded LSD, which is the correct code for most dairy liquid wastes. If a crust of waste material forms on the surface, thorough agitation is necessary in order to take a representative waste sample.

Surface scraped or stockpiled (SSD) — the "solid" wastes that are usually scraped from the feeding areas and the free stall barns, which can be stockpiled (dry stack). SSD accounts for about 20% of all dairy samples. The material is dried and analyzed. Calculated plant-available nutritional rates are reported on a wet basis (as the material was sampled).

Composted waste (FCD) — composted dairy waste, usually combined and turned with other materials and destined for use in potting media, amendments or other products.

Anaerobic lagoon liquid (ALD) — the liquid waste sampled from the manure/waste water volume of an anaerobic lagoon. Approximately 18% of the dairy samples received are coded ALD, and are probably coded incorrectly. Although common in the swine industry, anaerobic lagoons are rare in the dairy industry due to the higher solid content of the manure. The dairy waste storage basin may look similar to an anaerobic lagoon, but the two function differently. This difference influences the resultant rates of plant-available nitrogen.

Anaerobic lagoon sludge (ASD) — the solid waste that settles to the lagoon bottom due to inadequate bacterial decomposition.

Proper Sampling

Liquid slurry. Premixing the slurry in a pit or storage basin prior to sampling is ideal. An eight- to ten-foot section of one-half- to three-quarter-inch PVC pipe can be used to collect

samples. Insert the pipe into the pit, and then press a thumb over the end to create an air lock. Remove the pipe from the waste, place it over a container (i.e., clean, plastic bucket) and release the air lock. Do not rinse the sample into the container because dilution will distort results. However, if you plan to add water to the waste prior to application, then adding a proportionate amount of water to the sample is appropriate. Waste should be collected from several areas of the pit and mixed thoroughly. Transfer the thoroughly mixed slurry to a sample container (i.e., clean, beverage container) suitable for shipping. The container should be no more than two-thirds to three-fourths full to allow for expansion due to gas pressure.

Surface-scraped, stockpiled and composted waste. "Solid" waste is ideally stored on an impervious surface that is covered. Uncovered waste develops a weathered exterior that may not accurately represent the majority of the material. Rainfall moves water-soluble nutrients through the pile. Though composted waste is somewhat stabilized, mobile nutrients can leach. For stockpiled waste or compost, always sample to a depth of at least 18 inches at six or more locations. Thoroughly combine the collected material in a plastic container, and take a one-quart subsample for analysis. It is very important that the sample submitted represent the average moisture of the waste product. Refrigerate samples if they will be held for two or more days before shipping.

Sample Timing and Waste Application

Ideally, the storage basin should be sampled for liquid slurry a few weeks prior to anticipated application to allow adequate time to receive your report. Sampling, however, is often conducted as the agitated waste is being pumped for land application. Past waste analyses can provide general guidelines for land application, but a current analysis should always be used since nutrient concentrations can change due to feed ration, time of year, weather or duration of storage.

Waste Delivery Options

The NCDA&CS Agronomic Division recommends that you deliver your samples personally or use a service such as UPS, FedEx or DHL that will bring samples directly to our laboratory building in Raleigh. In select locations, the state courier service will pick up and deliver samples. You may also contact your local Cooperative Extension office, Soil and Water Conservation district office, or NCDA&CS regional agronomist to inquire about other delivery options. If you prefer to use the U.S. Postal Service, please be aware that delivery may take longer due to required handling by the N.C. Mail Service Center. The U.S. Postal Service also imposes additional shipping and packaging restrictions.

As stated earlier, plastic bottles containing liquid waste samples should be no more than two-thirds to three-fourths full. This prevents expansion and "explosion" during transit. A damaged sample is not good for you, the delivery service or the laboratory. It does not provide a representative sample for analysis. Finally, sample containers should be double-packaged (i.e., placed within two tied or sealed plastic bags) as a precautionary measure.

Resources & Stewardship

Waste analysis helps dairies use agricultural wastes responsibly, thereby protecting the environment and preserving water and soil resources. Good stewardship involves keeping detailed records of waste analyses and waste applications. Feel free to consult the staff of professionals at NCDA&CS for nutrient management assistance.