



Sampling Animal Manure

Hailin Zhang

Waste Nutrient Management Specialist

Douglas W. Hamilton

Waste Management Specialist

Oklahoma Cooperative Extension Fact Sheets
are also available on our website at:
<http://osufacts.okstate.edu>

The accuracy of a chemical analysis is only as good as the sample sent to the lab. The sample collected should closely represent the material to be used. Manure collected at one point in the system may be completely different from manure collected at another point. Manure characteristics can also change with the seasons. Sample and analyze manure close to the time when it will be used. If you only use it during a certain time of the year, sample during that time. Take samples at least once per year and whenever manure handling procedures change. If manure is used throughout the year, sample more frequently. Many laboratories supply sampling kits on request. Always consult with the lab before collecting samples. The representative sample collected may become useless, if the proper shipping and preservation procedure is not used.

Sampling Techniques

Litter Inside a Broiler or Pullet House

Dry litter varies across the width of the house—material near the curtains is different from that under feeders and waterers. There are also differences between brood and growout areas and even at different sides of a house. These differences must be considered to get a representative sample. The following techniques allow samples to be taken with birds in the house.

Trench Method

Using a shovel (a narrow spade works well), dig a trench as wide as the shovel across half of the broiler house (Figure 1). Start at the center line of the house and dig a trench in the litter to the sidewall. If there is cake, cut the caked litter to the width of the shovel and collect it too. Place the entire contents of the trench on a tarp or drop cloth. Thoroughly mix the litter using a hoe. Place a portion of this well-mixed litter into a zipper-closing plastic bag. Place it in a second bag. Use the litter remaining on the tarp to backfill the trench.

Zigzag Method

Walk the entire house in a zigzag pattern (Figure 1) and grab 15 to 20 subsamples with a shovel or coffee can. Collect the entire depth of the litter, but be careful not to remove soil beneath the litter. Place subsamples in a plastic bucket, and mix thoroughly. Take a small sample from the bucket and place in a zipper-closing plastic bag. Place in a second plastic bag.

Litter Inside a Breeder House (partially slatted)

A composite sample from a partially slatted breeder house can be sampled by collecting sub-samples from both slatted and litter areas. In all collect at least 20 sub-samples to get a representative sample of the building. Since 2/3 of the house is under slats, and 1/3 is litter area, collect 14 cores from under

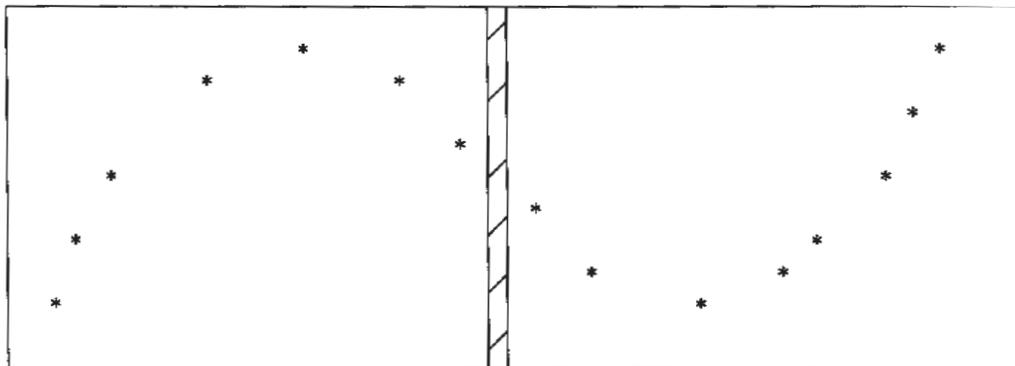


Figure 1. Taking poultry litter samples in the house using trench and zigzag methods.

the slats and 7 samples from the litter area. Sample through the slats using a soil probe or section of pipe. Collect litter samples similar to the zigzag method above. Place slat and litter samples in a plastic bucket and mix thoroughly. Take a small sample from the bucket and place in a zipper-closing plastic bag. Place in a second plastic bag.

Lagoon Effluent

If you only pump effluent from the top of a lagoon, you only need to take a sample from the upper two feet. Samples taken from the upper layer of the lagoon should represent the contents of the layer for several weeks, although lagoons do change from month to month. It is a good idea to sample lagoon effluent during the season of year you intend to irrigate. For instance, if you plan to irrigate bermudagrass in May and wheat in August, then take two effluent samples—April-May for the bermudagrass, and July-August for the wheat.

Bucket-Toss Method

A simple effluent sampler is a rope attached to a small plastic bucket. Throw the bucket out into the lagoon and let it sink. Slowly pull the bucket back to shore, being careful not to collect scum or solids with the sample. Then swirl the bucket and pour a subsample into a plastic container.

Dipper Method

Dipping is less accurate than the bucket-toss method. But if you object to handling an effluent covered rope, use a plastic bottle securely taped to a long pole. Make sure the pole is long enough to reach over any scum collected at the edge of the lagoon. Dip out a number of samples at different depths and locations, then mix the samples together in a bucket. Swirl the bucket and pour a subsample into a plastic container.

Entire Lagoon Contents

Sometimes, producers need to analyze the entire contents of a lagoon, or they need to measure chemicals deeper than two feet in the lagoon. Lagoons separate into layers (Figure 2). The bottom of the lagoon contains sludge. A scum or crust may form at the top of the lagoon. Between the sludge and scum is a large volume of liquid. To determine the total contents of a lagoon for diagnostic purposes, you must put together a sample from all the layers. You have two choices—collect a complete column of the lagoon profile or collect material from each layer and mix it into a composite sample based on the mass of each layer. Either way means getting out on the lagoon in a boat.

Column Sampler

A number of column samplers are commercially available. All are basically a long hollow tube (Figure 2) that is slowly lowered into the lagoon. Once the sampler reaches the bottom, the tube is closed off, so you can raise the entire column from the lagoon. Be sure the sampler is long enough to reach the bottom of the lagoon and wide enough to collect an undisturbed sludge sample.

Grab Sampler

A discrete or grab sample is a small sample taken from one layer (Figure 2). The idea is to grab the sample without disturbing layers above or below it. Discrete samplers use

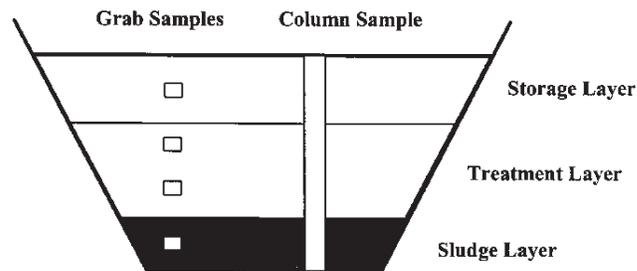


Figure 2. Sampling entire lagoon contents.

water pressure to force sludge or liquid into the sampler. The “Sidewinder” sampler is an easy to build grab sampler for lagoons. (Plans are available. Contact your county Extension educator). Once collected, discrete samples may be analyzed separately or combined into a composite sample for the whole lagoon.

Slurry From a Waste Storage Pond or Settling Basin

Layers form in a waste storage pond just as they do in a lagoon. Sampling the entire contents of the pond requires the same techniques as a lagoon. Storage ponds are mixed before slurry is spread on the field as fertilizer. You can use the bucket-toss or dipper methods to collect samples from ponds. But the pond must be agitated first! Solids contents change as the pond is pumped. Take small samples over the entire pumping period and mix into a larger sample. Remove a small subsample from the well mixed sample and place in a plastic container.

Slurry From Pre-fabricated Storage Structures

Above ground storage structures are agitated before spreading. The return line on a pump agitator should have a valve to allow you to take samples. Take a number of small samples while emptying the storage structure. To collect samples from a propeller-agitated pit, use the bucket-throw or dipping method. Remove a small subsample from the well-mixed sample and place in a plastic container.

Slurry or Semi-Solid From Pits Beneath Slotted Floors

Column samplers that are used to sample lagoons work in storage pits as well. Homemade column samplers work just as effectively, though. Take a section of plastic pipe narrow enough to slip through the floor slots, but wide enough to collect undisturbed solids. Lower the pipe through the slots until you feel the bottom of the pit. Cap the upper end, trapping a column of manure. Empty the entire contents of the pipe into a plastic bucket. Take samples from a number of locations throughout the pit. Swirl or mix the contents of the bucket and pour a subsample into a plastic container.

Solid and Semi-Solid Manure Off Feedlot Surfaces

Using soil probe, take a minimum of 20 cores randomly from the pen surface. Walk the entire area of the pen in a zigzag pattern to make sure you remove cores from all areas.

Be careful to remove only manure and not the hardened soil beneath. Collect cores in a plastic bucket and mix them thoroughly. Take a small sample from the bucket and place it in a zipper-closing plastic bag. Place the bag in a second plastic bag. Manure characteristics change with the age of cattle and other management differences, so you should sample representative pens of the same age and similar management practices.

Solid Manure From Stockpiles and Dry Stacks

Using a shovel, remove samples from several locations of at least 18 inches into the pile. Place subsamples in a plastic bucket. Mix, but do not allow the material to dry. Place a portion of the sample in a plastic bag. For added safety, place the bag in a second plastic bag.

Liquid and Slurry During Land Application

Sometimes it is easier to get a representative sample by collecting samples during application. However, the total N concentration of samples collected in the field may be lower than samples taken from storage because some ammonia is lost during application. Contact your local Extension educator or crop consultant before using samples collected in the field for fertilizer recommendations.

Catch Cans in the Field

This technique is especially useful if slurry is spread from a honey wagon or tank truck. Randomly place a number of cans in the field. Collect waste from the cans and mix in a large bucket immediately after spreading. Swirl the bucket to mix the contents and pour a subsample into a plastic container.

Slurry or Liquid From a Big Gun Sprayer

Some big gun sprayers have a valve at the spray riser used to drain the hose. Place a bucket under the valve and open while the gun is running. Open the valve slowly! Big guns operate at high pressures. Collect a number of samples while pumping, and mix together. Take a subsample from the well mixed material and place in a plastic container.

Sample Liquids From a Sprinkler Nozzle

Impact sprinklers and LEPA spray nozzles work at lower pressures than big guns, so it is safe to collect a sample directly from the spray stream. Place a bucket or cylinder directly in the stream. In large irrigation systems, collect a number of samples at different locations. Mix samples into a composite. Take a subsample of the well mixed liquid and place it in a plastic container.

After Collecting Samples

Ship liquid and slurry samples in a quart-sized plastic bottle with a screw top lid. Only fill the bottle half full to allow for gas expansion. Squeeze flexible bottles slightly before screwing on the lid. Place solid and semi-solid samples in zipper-closing plastic bags. Place a second plastic bag over both liquid and solid samples for extra safety. Use cardboard boxes to ship sample bottles and bags. Pack the box tightly with expanded styrofoam peanuts or shredded paper and seal with strapping tape.

Preservatives are generally not needed for manure samples used for fertilizer recommendations. Other analyses may require special shipping and preservation. This is especially true when collecting samples for biological or bacteriological analysis.

The Oklahoma Cooperative Extension Service

Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0607