Sampling Guide & Common Questions

2017 v2.1

About us

Weld Laboratories has served the analytical needs of the agricultural and environmental industries for nearly 40 years. Our motto has always been that chemistry is best performed by chemists.

From alfalfa and corn silage analyses to soil, manure, water, and gas/oil spill testing, Weld Labs offers a comprehensive list of analytical services to meet your needs.

Weld Labs has continuously been certified by the National Forage Testing Association (NFTA) since 1986 and holds certification in both NIRS and Wet Chemistry analyses.

Weld Laboratories

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Hay Sampling

Proper sampling of hay is incredibly important. The challenge at hand is obtaining a representative sample. The sample must represent the correct leaf to stem ratio (as well as the correct alfalfa to grass/weeds ratio). **Sample variation is almost always the main source of uncertainty in your analysis.**

General Instructions

1. How many samples do I need? First, identify your "lot" of hay. **A lot will be from the same field and cutting and will be grown and harvested the same way.** The NFTA recommends one sample per lot of hay.

2. When should I sample? The best time to **sample is after it has been baled and cured.** If the hay bales are rained on after sampling you should consider resampling because soluble proteins and fiber are lost. The quality of your hay is assessed at 100% dry matter so that it can be compared with other samples.

3. How should I sample? How much? **Use a hay probe** with a serrated tip at a 90° angle to the shaft (NFTA approved list: http://www.foragetesting.org/index.php?page=hay_probes). Some hay probes attach to a power drill for easier sampling. We have hay probes available to rent for $5/day and furnish sample bags for free. For each sample **randomly obtain 20 cores** at 1 core per bale. Drill from the end of the bale toward the center between the strings**. We want 1 half-pound of forage (1 half-full gallon zip-lock freezer bag).**

5. How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to include a feed analysis request form (http://weldlabs.com/feed-request-form.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. If you just want a "hay test" (RFV) **write "NIR" on the bag below the name of the sample (eg. "3rd Pivot North").** Don't forget to **include your email, phone, and physical address** so that we can get the report back to you.

6. How long will it take? We dry samples overnight. NIR analyses are typically completed the day after we receive them. Wet chemistry can take 4-5 business days. If you have an emergency we are capable of rushing a sample (surcharge may apply). Results are sent via both regular mail and email/fax. If our NIR indicates a poor match your sample will be transferred to a chemistry queue.

7. What if I want to add a wet chemistry test after I've received my NIR? We archive your dried and ground forage for a year at no cost to you.

Sampling Corn Silage or Haylage

1. How many samples? Where should I sample? **Sample from 10 to 20 locations** in the unloaded silo pile, feed bunk, or in front of 10-20 cows (**usually by grabbing handfuls but a scoop is better**). For trench silos and bunkers, collect silage from across the face of freshly exposed silage (exposed with a face shaver or loader bucket… don't grab handfuls directly when the silage wall could collapse). Generally it is best to sample using the same procedure (and precautions) for feeding. Sample randomly from all areas because silage pits are frequently composed of many different fields and can become stratified. All sub samples should be combined and mixed thoroughly in a clean 5 gallon plastic bucket to form a composite sample.

2. What other precautions are required? Wet silage samples can spoil rapidly in warm weather. Put the sample into a 1 gallon zip-lock freezer bag, **press the bagged sample to remove all the air**, and then seal the bag. The acid in the silage will continue to preserve it if there is no oxygen in the bag to cause secondary fermentation. It is important not to dry silage or haylage samples since the organic acids that preserve these feeds evaporate during drying.

3. How much sample do I submit? Submit **one pound** of the composite sample for analysis in a zip-lock freezer bag (1 gallon freezer bag most of the way full). Store sample in freezer until shipment.

4. How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to include a feed analysis request form (http://weldlabs.com/feed-request-form.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Most of our customers prefer our NIR TDN package. Many of our customers just **write "NIR" on the bag below the name of the sample** (eg. "3rd Pivot"). Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

5. How long will it take? NIR analyses are typically completed the day after we receive them. Wet chemistry typically takes 4-5 business days. If you have an emergency we are capable of rushing a sample (surcharge may apply).

6. What if I want to add a test later? We archive your dried and ground forage for a year at no cost to you.

Sampling Mixed Rations

Similar to Corn Silage above. Create a composite sample in a bucket by grabbing handfuls from in front of 10-20 animals or out of the mixer. Sample randomly from all areas. **Submit one pound** (about a 1 gallon freezer bag full) of material in a zip-lock freezer bag. Processing TMR samples typically takes 4-5 business days as wet chemistry is required.

Sampling Dog Treats or Dog food, Bird seed, Pet Food, Feed Grain, Distillers Grain

How should I sample? When sampling dog treats, dog food, bird seed (or other pet food) the most important thing is to **be random**. The eye will naturally wander to the best/worst regions of your batch. Sample **10-20 small scoops** and be sure to submit at least one-quarter pound (100 grams) of material.

What else do I need to know? These samples **almost always need to be defatted** prior to grinding which adds a little extra analysis time. Typical turn-around is **4-5 business days**. Be sure to use **zip-lock bags** for the sample and double-bagging is usually a good idea for fatty samples. Typically you order a "Guaranteed Analysis" package for Moisture, Protein, Fat, and Crude Fiber. We archive dried, defatted material but not the "as received" material.

Sampling Mineral supplements, Pressed Pellet feeds, oils, soybean based supplements

How should I sample? Sample **10-20 small scoops** or regions as usual. We need at least 100 grams of material (**we prefer half a pound of sample**). Please also submit the **expected mineral values (if they are known)** with your feed request form as it saves us time in the analysis. The best container is a **zip-lock bag** and double-bagging is a good idea for fatty samples. **If the sample is a liquid, use a plastic bottle** instead of a bag.

How long will it take? These analyses are performed via wet chemistry and **generally take 4-5 business days**.

How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to **include a feed analysis request form** (http://weldlabs.com/feed-request-form.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Be sure to **write the name of the sample on the bottle/bag**. Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

Flaked Corn

Why test flaked corn? Starch gelatinization is a process for making starch more digestible. This is typically performed through grain processing (rolling or flaking). Many factors influence starch availability or gelatinization including corn quality, cook time, cook temperature, roll conditions and flake density. A problem commonly encountered has been the lack of a reliable, scientific method for determining available starch. Weld Laboratories perfected and patented a method for determining gelatinized starch in steam-flaked grains (US Patent No. 6,326,043). By using the results generated by our method the **consumer can choose between different processed grains** or the processor can **make adjustments to the flaking conditions**, increasing or decreasing the percent gelatinized starch in the grain.

What else do I need to know? The analysis **compares the processed grain with the whole grain**, so customers are advised to send in a sample of the unprocessed grain with their sample whenever possible. There is no **extra charge for the unprocessed grain** when it is accompanied by a flaked or rolled sample.

How much sample? What container do I need? **One pound samples** should be submitted (of both the flaked and whole corn) in **one-gallon zip-lock freezer bags**.

How long will it take? These starch analyses are involved and generally take 4-5 business days. (We run starches on Wednesday so your fastest turn-around is available if your samples are here on Monday).

How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to **include a feed analysis request form** (http://weldlabs.com/feed-request-form.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Be sure to **write the name of the sample on the bottle/bag**. Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

Fertility Soil Sampling

Soil testing is the single most important step in managing a soil nutrient amendment program. Soil tests protect the environment from extra runoff while saving you both time and money. The challenge with soil sampling is reducing the quantity of soil to a testable size. A 20 acre plot contains over 16000 tons of topsoil (at a 6" soil depth), and of this only 5 grams are used for a nitrogen test!

How to Sample

How many samples? First, identify how many "types" of soil you have. Soil types can vary geographically (hillside vs. bottom), by tillage, previous fertilizer amendment, previous crop, etc. The maximum size is about 40 acres. From this you **must randomly obtain 10-20 soil cores per sample then submit one sample per type of soil to the lab.**

How deep should I sample? The **soil depth should match the primary tillage or root zone of the crops** you are growing (usually 6"). **Mix the cores in a bucket and submit a 1 quart bag filled with soil to the lab.** If you manage a zero-tillage field it is advised to submit 0-3" samples as well as 3-7" to determine stratification. We also routinely analyze sub-soil nitrogen levels from deeper cores.

What tools do I need to sample? The best samples are obtained with **a soil probe** (depicted above). If you don't have a probe we can rent one of ours to you for $5/day. If you live too far away you can dig a "V" into the soil with a spade and take a 1" thick slice along either side. Stainless steel is desired as galvanized tools (or brass/bronze) may add copper/zinc to the soil.

How long will it take? These samples are very involved and generally require 5-7 business days to process.

How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to **include a soil analysis request form** (http://weldlabs.com/soil-analysis-purchase-order.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Be sure to **write the name of the sample on the bottle/bag**. Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

Livestock/Pond/Ditch Water Sampling

How and when should I sample? Collect irrigation quality samples after the first irrigation cycle has finished. **Allow water to run** for enough time to flush debris prior to sampling. Do not collect samples while injecting fertilizer or chemicals. Collect livestock suitability samples from the streams, lakes, or ponds that they are drinking from. Samples should be collected from the surface by pointing the open bottle in the direction from which the water is flowing. Subsurface samples should note the depth of sampling. Pond, lake, and river water is sampled this way as well.

What container should I use? The container should be a **one-liter plastic bottle**. We provide containers if you can come to the lab. If you are in a hurry purchase a one-liter drinking water bottle, dump it out, then rinse it with sample a few times before filling.

Note: if you are sampling for bacteriological tests you will need an additional container (see sampling drinking water section below). Typically you sample the water source instead of the water trough itself because the animals using the water will contaminate it.

How long will it take? Typical wet chemistry for livestock suitability or irrigation quality takes **3-4 business days**. This can increase or decrease depending on your list of analyses.

Deliver the water sample to the lab **within 24 hours. Do not freeze**.

How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to **include a chain of custody** (http://weldlabs.com/chain-of-custody.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Be sure to **write the name of the sample on the bottle/bag**. Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

Drinking Water: Sampling for Potability

What container should I use? Drinking-quality water requires special containers and holding times for analyses performed on coliform bacteria. **The preferred container for drinking water is a sterile Whirl-pak bag** or 250 ml plastic bottle. We don't reject samples but a sterile container is important.

What precautions are required? Wear gloves when collecting samples. Take care not to contaminate the container with your hands or environment. **Flush the water line** for 2 minutes (unless you are sampling for metals… in which case sample immediately), then reduce the flow and quickly open the container. Be careful not to contact the mouth of the container with the faucet. **Fill the container leaving one inch of headspace**, seal the container (whirl the bag or screw on the cap) and place into a cooler with ice for delivery or **overnight shipment** to the laboratory. **Do not freeze**.

When analyzing for bacteria you should avoid any faucets that mix hot water and cold water (we want to only sample cold water). Follow aseptic sampling protocols.

What if the sample is chlorinated? If the bacteriological sample is chlorinated, 18 mg/L sodium thiosulfate should be added to remove chlorine.

How long will it take? Typical wet chemistry for drinking takes 2 **business days**. This can increase or decrease depending on your list of analyses.

How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to **include a chain of custody** (http://weldlabs.com/chain-of-custody.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Be sure to **write the name of the sample on the bottle/bag**. Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

Manure Sampling

Weld Labs is a full service laboratory. While some laboratories only process manure or compost we process manure, compost, fertilizer, and soil. This integrated approach empowers our customers to customize their soil amendment program according to compost/manure they have on site before extra fertilizers are purchased.

Why sample manure? When should I sample? Sampling manure presents a special set of challenges. Each species and age of animal will release a different nutrient profile in their manure. Manure also varies according to how it was stored and handled (stratifies in storage). In general, manure tends to be heterogeneous, which is why sampling is important. For best results **manure should be sampled annually, just prior to application**. The risks of sampling too early are losses of nutrients during storage, and losses during handling (e.g. ammonia).

There are generally **two types of manure** which have different methods of sampling: semisolid or **liquid manure**, and dry or **solid manure**.

What special challenges does **liquid manure** present? Liquid storage facilities tend to have higher concentrations of ammonia and other hazardous gasses, so **sampling is best performed during application (for safety reasons)**. If you must enter a liquid storage facility be sure that you **aren't alone** (take a sampling partner with you) and have the **proper protective equipment** (self-contained breathing apparatus etc.). When sampling liquid note that the **solids, which tend to settle at the bottom, contain much of the phosphorus**. Agitate the manure prior to sampling to include these solids… unless you will pump the liquid off during application (e.g. like lagoon water). The best tool to harvest composite samples is just a long PVC tube with a 1-2" outer diameter that has a rubber stopper or ball attached to a string or rod. One must simply insert the tube, pull on the string, and release the column of liquid into a 5 gallon bucket for mixing (with a ladle). After mixing label and **freeze the sample (stored in a 1 liter plastic bottle filled 70% full)** and deliver it to Weld Laboratories, 1527 1st Ave, Greeley CO 80631.

What about solid manure? The primary difference for solid manure is that it isn't well mixed already. This means you need **10-20 samples from different regions**. Carefully obtain a representative sample as there is usually bedding straw and urine of various ages which complicate the task. **Mix the sample in a 5 gallon bucket** and store in a **one-gallon zip-lock bag 70% full (remove excess air)**. **Label and freeze the sample** and deliver to Weld Laboratories, 1527 1st Ave, Greeley CO 80631.

How long will it take? Manure wet chemistry typically takes **4-5 business days**. This can increase or decrease depending on your list of analyses.

Compost Sampling

Weld Labs is a full service laboratory. While some laboratories only process manure we process manure, compost, fertilizer, and soil. This integrated approach empowers our customers to customize their soil amendment program according to compost/manure they already have on site.

Why sample compost? When should I sample? Compost is a key ingredient on many farms and when properly applied can save a ton of money. It is important to sample your compost because the composition frequently changes, **generally every 3-6 months**. If you are using the compost in a soil amendment program, sample again just before application.

How to sample? For a pile of compost cut into it with a loader and **take a few samples from each wall with a long spading shovel** or auger (careful not to risk wall collapse, wear proper personal protective equipment). You want to **sample 10-20 places in the pile randomly** so that natural stratification is accounted for. (If the compost is bagged or stored in a different method be careful to get a representative sample). **Mix these thoroughly into a 5 gallon bucket** and submit a **1 gallon zip-lock freezer bag 70% full** of material. Be sure to remove excess air and refrigerate (cool to 4 °C) prior to delivering it to the lab. Deliver to Weld Laboratories, 1527 1st Ave, Greeley CO 80631.

How long will it take? Compost wet chemistry typically takes **4-5 business days**. This can increase or decrease depending on your list of analyses.

How do I get it to the lab? You can drop it off at the front desk (1527 1st Ave. Greeley, CO 80631). If it is after hours we have a drop box where you can stash your sample and lock it. You can send it via UPS/FedEx/US Mail/etc. as well. Be sure to **include a chain of custody** (http://weldlabs.com/chain-of-custody.pdf) with your requested tests marked. If you don't know what you want, or ever have any questions feel free to call and talk with us (970) 353-8118. Be sure to **write "compost" and the name of the sample on the bottle/bag**. Don't forget to **include your email/phone/physical address** so that we can get the report back to you.

Soil or Water sampling for volatile organic compounds (VOC) including BTEX and Gas Range Organics

What precautions are required? VOC sampling is commonly performed after accidental gasoline spills or when cleaning up sites where gasoline and other fuels were used or produced. **CAUTION: You will be sampling for substances which are hazardous to your health. Many of these substances are mutagens and teratogens. All of them are dangerous to breathe and require special training to sample and handle. Wear appropriate personal protective equipment (Level B PPE with self-contained breathing apparatus, gloves, and suit) while sampling and never sample alone.**

How to sample? When sampling, follow a prescribed sampling plan. You should **obtain your samples randomly** throughout your sampling area. **Field blanks are always valuable** because they can help trace back contamination issues. **Surrogate compounds are optional, but valuable** in tracking container integrity and validation. We recommend adding toluene-d8 for your surrogate. Samples are captured in VOA (Volatile Organic Analysis) vials, **always obtain two vials for each sample** (obtain three if high levels of contamination are expected). Samples need to arrive at the lab **within 48 hours** of collection. VOC's have separate procedures for water and soil (below).

If you are sampling water try not to aerate the sample as you will lose the volatiles to the atmosphere. The general procedure is to **fill the vial 70% full, then add surrogate, then 6 normal HCl until the pH is less than 2** (many people just add three drops), and finally fill to the brim so that there is no headspace. **Cool the sample to < 4°C without freezing and ship overnight** or deliver to Weld Laboratories. If the samples are chlorinated or suspected of active bacteria preserve with sodium thiosulfate (18 mg/L) before the surrogate or acid are added.

If you are sampling soil we want to **obtain undisturbed soil cores** small enough to fit inside a VOA vial. You can use a steel pipe/plunger system (5/8" ID steel pipe) or a proprietary En Core VOC sampler. **Disturbing the soil core can cause the volatile gasses to escape**… try to avoid this. Always use pre-tared and labeled VOA vials from Weld Laboratories. **Put samples on ice (cool to < 4°C) and ship overnight** or deliver to Weld Labs 1527 1st Ave. Greeley, CO 80631.

How long will it take? BTEX/VOC wet chemistry typically takes **5-7 business days**. This can increase or decrease depending on your list of analyses.

Soil or Water sampling for semi-volatile organic compounds (SVOC)

SVOC procedures can also be found in EPA method 8270. Sampling is commonly performed when contamination concerns are present. **CAUTION: You will be sampling for substances which are hazardous to your health. Many of these substances are mutagens and teratogens. All of them are dangerous to breathe and require special training to sample and handle. Wear appropriate personal protective equipment (Level B PPE with self-contained breathing apparatus, gloves, and suit) while sampling and never sample alone.**

When sampling it is important to follow a prescribed sampling plan. You should **obtain your samples randomly** throughout your sampling area. **Field blanks are always valuable** because they can help trace back contamination issues. **Surrogate compounds are optional, but valuable** in tracking container integrity and validation. We recommend adding 2,4,6-tribromophenol for your surrogate. Samples are captured in **1 liter amber-glass containers for water or wastewater** and 4 oz. jars for soil/sediment (we need 100 grams of soil minimum). **Refrigerate samples (cool to < 4°C) and ship within three days (in a cooler)** or deliver to Weld Labs 1527 1st Ave. Greeley, CO 80631.

Soil or Water sampling for Total Petroleum Hydrocarbons (TPH-HEM) or Total Recoverable Petroleum Hydrocarbons (TRPH-SGTHEM)

When sampling it is important to follow a prescribed sampling plan. You should **obtain your samples randomly** throughout your sampling area. **Field blanks are always valuable** because they can help trace back contamination issues. Samples are captured in **1 liter glass containers for water or wastewater** and 4 oz. jars for soil/sediment (we need 100 grams of soil minimum). Water follows EPA method 1664, Soil follows EPA method 9071B (Oil and Grease). Water is added to a glass container that already contains H_2SO_4 preservative (don't rinse the container with sample) and refrigerated to < 6 °C. Soil is added to a 4 oz. soil/sediment jar (filled to the top) then refrigerated to 4°C. For an aqueous sludge or semi-solid acidify to pH < 2 to preserve.

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Disclaimer:

This document provides a general summary of techniques used for the collection of chemistry samples for various analyses. Other approaches to sample collection may be acceptable or desirable under given conditions. This document is intended as a refresher for those already trained in sample collection.

References:

Our services and pricing guide: http://weldlabs.com/electronic-services-and-pricing.pdf

Dan Putnam's Recommended Principles for Hay Sampling.
http://www.foragetesting.org/files/hayprotocol.pdf

EPA Method 5035.

https://www.epa.gov/sites/production/files/2015-07/documents/epa-5035a.pdf

EPA Quick Guide to Drinking Water Sample Collection.

https://www.epa.gov/sites/production/files/2015-11/documents/drinking_water_sample_collection.pdf

Corn Silage Sampling.

http://store.msuextension.org/publications/AgandNaturalResources/MT201610AG.pdf

EPA SW 846

https://www.epa.gov/hw-sw846