



CDQAP - WDR General
Order Reference Binder
TAB 5.5, Version 2-29-08

Sampling Protocol for Plant Tissue Corn and Winter Forage Silage

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In May, 2007 the Central Valley Regional Water Quality Control Board (Regional Board) adopted Waste Discharge Requirements General Order R5-2007-0035 for Existing Milk Cow Dairies (the General Order). The General Order requires that **plant tissue samples** be taken at harvest for each land application area (field) identified in the Nutrient Management Plan (NMP). Sampling must begin within 12 months of the adoption of the General Order (no later than May 3, 2008), and then at each crop harvest during coverage under the General Order¹. If you are covered under the General Order, you will need to comply with plant tissue monitoring requirements. Results must be submitted to the Central Valley Regional Water Quality Control Board as part of the annual reporting activities (due July 1 of the following calendar year).

Part I – Identification of Sampling and Analytical Requirements

1. Table 1 outlines the constituents and frequency of sampling analysis requirements specified under the General Order.
2. Contact your analytical laboratory to obtain sample containers, labels and chain of custody forms.

Table 1. Nutrient Monitoring-plant tissue (minimum regulatory requirements)

At Harvest:

Record the total weight (tons) and percent wet weight (% moisture) OR volume (cubic yards) and density (grams per liter) of harvested material removed from each land application area.

Laboratory analyses for total nitrogen, phosphorus, and potassium (expressed on a dry weight basis), and percent wet weight (if weight of harvested material is reported) or density (if volume of harvested material is reported).

The following test is only required if the Discharger wants to add fertilizer in excess of 1.4 times the nitrogen expected to be removed by the harvested portion of the crop (see Attachment C for details): Mid-season, if necessary to assess the need for additional nitrogen fertilizer during the growing season.

Laboratory analyses for total nitrogen, expressed on a dry weight basis.

Part II – Sample Handling, Storage & Frequency Considerations

1. **Sample handling-** Sample handling is important to ensure accurate results, especially for moisture content. Poorly handled samples (not airtight, get too hot) will provide inaccurate information. Because nutrients are analyzed on a dry weight basis, an incorrect moisture estimate (even a small difference) can lead to large errors in estimating nutrient uptake. Chopped forage loses moisture very rapidly, especially in hot weather. Chopped samples must be immediately placed into airtight plastic bags. Gallon sized (approximately 9 X 12 inch) seal top bags work well for sub-samples, and 10 x 8 x 24 gusseted bags which can be knotted are ideal for composite samples. Remove all excess plant material from the seal area to allow for complete closure.
2. **Sampling frequency-** Composite sampling-creating one sample from several small samples- is the most reasonable method for sampling forages. It is important that the composite sample represent the field production. In general, the more variable the field, the more sub-samples should be taken to ensure the accuracy of the sample. Moisture content can vary greatly across a field and within a day. A sub-sample should be taken from each 5 acre area in the field. No more than about 40 acres should be represented by a single composite sample. Composite sub-samples by field and time of day (am, pm). A separate composite sample should be created for each morning and afternoon when more than a half-day is needed to harvest a field. Refer to your sampling and analysis plan for site specific sampling frequency needs.

For safety purposes, the samples should be taken by the silage truck driver from their own freshly dumped load. A single truck and driver may be designated to pull the samples provided that truck will be making enough loads at appropriate intervals.

3. **Sample storage-** Samples should be stored in a cool, dry environment both during and after sampling. Ice-cooled chests are ideal for sample storage. Ice in a tightly sealed trash bag, sealed ice substitute, or 12 v cooler in the designated truck are suggestions to keep the samples at or below 60°F for up to 12 hours, after which time they must be refrigerated. If a refrigerator on the dairy is available, that is an ideal place to store the morning samples while the rest of the field is harvested. If needed, samples may be stored in a refrigerator for up to three days prior to lab delivery.

Part III – Sample Collection

1. Gather sampling equipment needed, e.g., bags, permanent marker, cooler and ice or ice substitute, labels for sample identification, chain of custody forms, notebook for record-keeping, etc.
2. Designate which truck or trucks will be taking samples.
3. Label composite sample bags with field identification (consistent with NMP field labeling), the date and time of sampling, the name of the person taking the sample and whether it is a morning or afternoon sample.

4. Use clean, dry hands. Grab 4 – 6 small handfuls of silage from different places around each designated freshly dumped load and place into a 9" x 12" (approx) sampling bag. Avoid sampling material that was at the top of a truck because silage exposed during transport is subject to large moisture losses and should not be included in the sample.
5. Compress all air from the bag immediately and carefully and seal tightly.
6. Store sample bags in a chilled cooler. See Part II above for recommendations on preventing water contamination of samples during storage.
7. Continue steps 4 - 6, collecting sub-samples at least every five acres, or four sub-samples per field or half-day, whichever is more. Fields which are more variable should have more sub-samples to improve accuracy.
8. Repeat above steps to create an afternoon or "pm" sample from the same field if necessary.
9. Create a single composite sample by emptying all sub-samples taken from the same field during the morning (or afternoon) into a large clean, dry plastic bag, assuming less than about 40 acres was harvested during that time period. Thoroughly mix the samples together by stirring with clean dry hands, working quickly to minimize moisture loss. Place about 1 quart or 1 liter of the mixed sample into a tall plastic bag into a pre labeled bag (see step 3 above), compress to remove air, and knot-off close to the sample.
10. Complete a chain of custody form and record the required information below in a notebook.
11. Keep refrigerated until deliver to laboratory within 72 hours.
12. Keep a copy of the chain of custody form and records on sample collection & sample identification

Additional information

Contact your analytical laboratory for additional information on sample collection, handling, preservation, and delivery. Contact the Central Valley Regional Water Quality Control Board for any other information requests.
http://www.waterboards.ca.gov/centralvalley/water_issues/dairies/sampling_procedures.pdf.

Information in this document was compiled by CDQAP to assist dairy producers in understanding and complying with the General Order Waste Discharge Requirements for Existing Milk Cow Dairies (Central Valley Regional Water Quality Control Board Order R5-2007-0035). Effort has been made to ensure accuracy, but these summaries are not official regulatory guidance and are not legal advice. Producers are advised that these summaries are not intended to be a substitute for producers reading the complete order and consulting their own legal counsel to ensure compliance with the waste discharge requirements. Should any information here conflict with the General Order and/or official information provided by the Regional Board, Board-provided information takes precedence.

Technical review provided by: Regional Water Quality Control Board 5 CAFO staff. Financial support was provided wholly or in part by grants received from the California Dairy Research Foundation, and from the SWRCB Grant number 05-095-550-0. The contents of this document do not necessarily reflect the views and policies of the US EPA, SWRCB, or RWQCB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.