



Solid Manure Moisture Content Determination-Microwave Method for Exported Solid Manures

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In May 2007, the Central Valley Regional Water Quality Control Board (Regional Board) adopted Waste Discharge Requirements General Order No. R5-2007-0035 for Existing Milk Cow Dairies (General Order)¹. The Monitoring and Reporting Program of the General Order requires analyses of various types of materials to define baseline conditions, develop and implement a Nutrient Management Plan (NMP), and describe potential pollutant load in illegal discharges. The General Order requires dairy operators to sample **solid and slurry manure** exported off site or applied to their own farm land and to document the density or moisture content of material applied during each event. Methodologies to obtain, store and transport a representative sample are described in reference document 5.2 in the CDQAP WDR General Order Reference Binder. This document focuses on determining the moisture content of solid manure on farm.

Equipment needed

1. Scale measuring in grams
2. Paper plate(s) or weigh boats
3. Microwaveable cup with water
4. Stirring utensil (metal or glass rod)
5. Notebook

Method

1. Zero the scale.
2. Record the initial weight of the empty plate or weigh boat as **B** in the table.
3. Tare the scale with the empty plate or weigh boat by zero-ing.
4. Add approximately 100 grams of a representative sample of the solid manure to the plate. Record as **A** (sample weight at start) in the table.
5. Place the plate with sample in the microwave.
6. Place a glass of water in the microwave with about 6 ounces of water.
7. Microwave at 50% power for 5 minutes.
8. Open the oven door and allow the steam to dissipate for a minute or so. Remove the sample from the oven. Zero the scale, weigh the sample and plate, and record as #1 in the table. Stir the sample gently to distribute any hot spots. (If charring occurs discard the sample and begin again with a lower power setting or for a shorter time period.)
9. Check the water level in the glass and add water as needed.

¹Central Valley Regional Water Quality Control Board. 2007. Order No. R5-2007-0035. Waste Discharge Requirements for General Order for Existing Milk Cow Dairies. Adopted May 3. Available at http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2007-0035.pdf.

10. Repeat steps 7-9, recording each weight in sequence, until the difference between one sample weight and the next is less than 5 grams.
11. Microwave at 50% power for 2 minutes.
12. Open the oven door and allow the steam to dissipate for a minute or so. Remove the sample from the oven. Zero the scale, weigh the sample and plate, and record as the next weight in series. Stir sample to distribute any hot spots.
13. Check the water level in the glass and re-fill as needed.
14. Repeat steps 11-13 until the difference between one sample weight and the next is less than 1 gram.
15. Calculate the %moisture using the final weight as **C** in the formula:

$$100-(C-B)/(A*100) = \%Moisture$$

Example calculation:

Date	4/3/08	Technician	M.E.
Manure source	Corrals 1-3	Sample number	1
Reading		Weight (grams)	
A			109
1	Time: 5 min		95
2	Time: 10 min		53 (accidentally set oven to "hi", but didn't notice any charring)
3	Time: 15 min		43
4	Time: 20 min		39
5	Time: 22 min		38
6	Time: 24 min		37
7	Time: 26 min		38
8	Time: 28 min		38
9			
10			
B			8
C			38
Moisture content of manure: 100 - [(C-B) / (A) *100]			100-[(38 - 8)/(109)*100] = 100 - 27.5 = 72.5% moisture

References

Peters, John, S. Combs, B. Hoskins, J. Jarman, J. Kovar, M. Watson, A. Wolf and N. Wolf 2003. Recommended Methods of Manure Analysis (A3769), University of Wisconsin-Extension Publishing Operations, Madison, WI.

Information in this document was compiled by UCCE 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.

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Data Record

Date	Technician
Manure source	Sample number
Reading	Weight (grams)
A	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
B	
C	
Moisture content of manure: $100 - [(C-B) / (A) * 100]$	