



Measuring the Dry Matter Content of Forages

Silage Note
No. 7

All plants are composed entirely of dry matter (DM) and water. This means that if forage has a DM content of 45%, then it contains 55% water (or moisture).

To ensure a good silage fermentation most crops and pastures need to be wilted to increase the DM content before they are ensiled. The target DM range for a range of crops and pastures commonly harvested for silage is covered in more detail in Silage Notes 4 and 6.

Collect a representative forage sample before harvest (baling or chopping) to determine whether the forage DM content is within the target range.

Use either the hand squeeze method, the microwave oven method or a suitable moisture meter to estimate DM content.

Sampling technique

Before testing for DM content you must obtain a representative sample of the forage to be harvested:

- collect samples from several locations over the area to be harvested;
- sample the complete depth of the windrow or swath - from top to bottom;
- sample from the complete width of the windrow or swath; and
- avoid non-representative areas such as heavy broadleaf weed infestations and light or heavy patches of crop. These may have a different DM content to most of the area.

To obtain a representative sample it is often necessary to collect more material than is needed. This should then be sub-sampled using the following method:

- 1) Place the collected material on a clean surface to avoid contamination;
- 2) Mix thoroughly, split the sample in two (or four) piles, retaining only one pile for testing;
- 3) If the sample is still too large remix and repeat the process. A handful of forage is needed for the hand squeeze method, while about 100 to 150g of fresh material is needed for the microwave oven method.

Goals for Successful Silage

- Harvest forage for silage within the target DM range.
- Collect the forage from several locations in the paddock to ensure the sample being tested is representative of the batch.
- The methods below give easy and relatively quick and accurate estimates of forage DM content.

Hand squeeze method

Hand squeezing is a quick and easy method to use in the field and is more accurate than “wringing” a handful of unchopped grass.

Initially it may be necessary to check your accuracy by using the microwave oven method, or be guided by someone with experience in using this method.

- 1) Collect representative samples of the forage.
- 2) Mix the samples thoroughly and take a sub-sample.
- 3) Cut the forage into 1-2 cm lengths.
- 4) Tightly squeeze a handful into a ball for about 30 seconds.
- 5) Quickly open hand.
- 6) Estimate DM content from the table below.

Note that at the same moisture content, stemmy material tends to feel drier than leafy material e.g. grasses and lucerne feel drier than clover. Forage that is wet from heavy dew or rain will feel wetter than it is.

DM Content	Condition of the Sample
Below 25%	Free moisture runs through fingers as material is being squeezed. When pressure is released the ball of chopped forage holds its shape. A lot of free moisture is present on hand.
25% - 30%	Ball just holds its shape. No free moisture expressed. Hand moist.
30% - 40%	Ball falls apart slowly. No free moisture. Little or no moisture on hand.
Over 40%	Ball springs apart quickly.



Microwave method

This method will give a relatively accurate measure of DM content. You will need a standard kitchen microwave oven and digital scales that measure to units of one gram.

The method:-

Follow steps 1 and 2 of the hand squeeze method on the previous page, then:

- 3) Cut the sample into 3-4 cm lengths. The size of the sample you will need should be equivalent to the amount that could be heaped onto a large dinner plate (i.e. about 100 to 150 grams).

Tare the scales for a container suitable for use in a microwave.

- 4) Weigh the sample of chopped forage in the tared container, measuring to the nearest gram. Record this as the **initial wet weight**. Spread the material evenly over the container and place it in the oven with a glass three-quarter full of water.

WARNING: The glass of water prevents the forage sample from charring or igniting as it becomes completely dry. The water level must be maintained during oven use and may have to be replaced with cold water if it starts to steam or boil to prevent absorption by the drying forage.

- 5) Dry on full power (high) for intervals of 3 to 5 minutes to begin with until the sample begins to feel dry (time depends on sample size, shortness of chop and initial DM content). Record the weight after each drying interval and repeat.

Samples should be turned and “fluffed-up” after each drying interval to improve evenness of drying.

- 6) When the sample begins to feel dry reduce the drying interval to between 30 seconds and one minute.

- 7) When the weight of the sample does not change after two or three drying intervals it is 100% dry (to within 1-2% units). Record this **final dry weight**.

If the sample chars or burns, use the previous recorded weight. Occasionally the weight may increase if the sample absorbs some moisture from the glass of water; use the last recorded weight if this happens.

- 8) Use the DM calculation table below to calculate DM content.

Moisture Meters

Most commercially available moisture meters are suitable for use with hay but not silage.

There are a few however which claim to be accurate down to 30% dry matter (70% moisture) which would be useful when estimating silage DM%.

CALCULATING DRY MATTER CONTENT:

Final Dry Weight (g) X 100 =% Dry Matter
Initial Wet Weight (g)

Example 1. $\frac{50 \text{ g}}{150 \text{ g}} \times 100 = 33.3 \text{ \% DM}$

Example 2. $\frac{48 \text{ g}}{112 \text{ g}} \times 100 = 42.8 \text{ \% DM}$

Note: Have you allowed for the weight of the plate?

The information in this Silage Note is taken from the *Successful Silage* manual

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (May 2008). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

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