

Measuring herbage mass – the median quadrat technique

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The median quadrat technique for measuring herbage mass (kilograms of dry matter per hectare, kg DM/ha) is only one of several methods available.

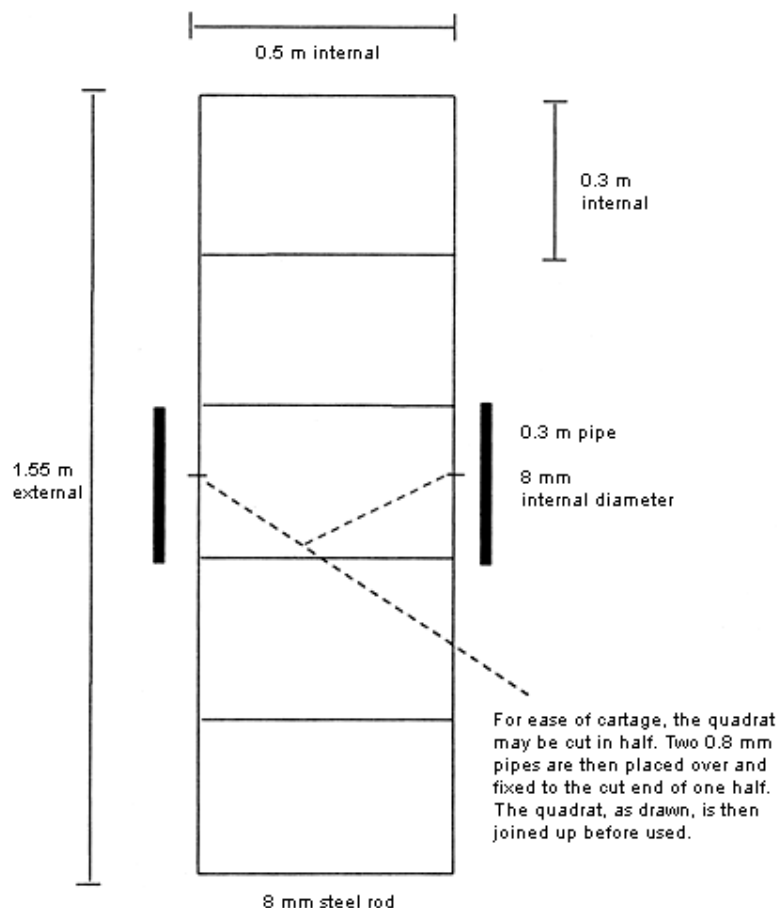
Equipment required

- 1.5 m × 0.5 m median quadrat. It is important that the dimensions are followed accurately (see

Figure 1).

- Battery-operated or hand-operated shears
- Plastic bags
- Four marker pegs
- Force draft or microwave oven
- Scales capable of weighing to a gram
- Forceps or tweezers
- Pen and paper

Figure 1. The dimensions of the median quadrat



Method

Step 1

Choose the area of pasture to be assessed. This can be about 30 m × 30 m and its boundary identified with pegs, one in each corner. If this technique is used to predict the herbage mass of paddocks, selection of an area that adequately represents the paddock will be critical for an accurate assessment. Before selecting the representative area it is essential to evaluate all parts of the paddock to obtain an appreciation of the extent of the paddock's variation. The area selected should represent average yield (herbage mass) and composition (green, dead, legume and weed) of the whole paddock.

Step 2

Following selection, walk a set number of paces (5–10) inwards from the edge of the area and place the quadrat at your toe. Herbage which has been bent over by the quadrat should be straightened.

Step 3

Eliminate the two highest-yielding and two lowest-yielding subquadrats by eye. Cut all herbage within the remaining subquadrat to ground level and store in a plastic bag. Remove stones, dirt and faeces from the sample.

Step 4

Starting from the cut area, change direction and repeat steps 2 and 3 at least 4–9 times. As the variation in the assessment area increases, increase the number of cuts (up to 10). Upon reaching the boundary of the selected area, turn 90°, turning back into the area, and continue pacing.

Step 5

Record the weight of herbage in each bag to the nearest gram. The data sheet (see the last page of this Primefact) can be used to record weights. Calculate the average weight of the cut quadrats. Ensure the bag weight is not included.

Step 6

Bulk the herbage from all bags.

Step 7

Thoroughly mix the herbage so it appears uniform throughout. Split the herbage into four equal amounts. Discard two diagonally opposite portions. Recombine the remaining two portions.

Step 8

Repeat step 7 until a sample equal to that which could be heaped onto a large dinner plate (approximately 150 grams) remains.

Step 9

To estimate the **pasture dry matter percentage (DM%)**, first record the weight of the sample. Then place the sample in a force draft oven for at least 24 hours below 70°C, that is, until the weight of the sample is constant. Alternatively, use a microwave oven. If a microwave oven is used:

- Place the sample on a microwave dish in the oven, along with a cup of water. Refill the cup if the water level gets too low.
- Set the microwave to maximum power, and dry for 5 minutes.
- Weigh the sample, turn it over and loosen it (the sample tends to compact while drying).
- Repeat steps b and c until the weight remains constant at successive weighings. As the sample becomes dry, 1 minute intervals in the microwave are recommended.

To calculate the dry matter percentage, use the following formula:

$$\text{DM\%} = \frac{\text{weight of sample dry (g)} \times 100}{\text{weight of sample wet (g)}}$$

Step 10

To estimate **herbage mass (kg DM/ha)** for the area being assessed, first multiply the average weight of herbage calculated in step 5 by the dry matter percentage calculated in step 9. Multiply this figure (in grams) by 67:

$$\begin{aligned} &\text{Herbage mass (kg DM/ha)} \\ &= \\ &\text{av. weight of herbage} \times \text{DM\%} \times 67 \end{aligned}$$

For this figure to be appropriate, the dimensions given for the median quadrat must be followed accurately.

Step 11

To obtain an estimate of **pasture composition** (% legume, % green and % dead) use the oven-dried sample. If the sample is significantly larger than an open handful, it can be reduced using the technique described in step 7. Sort the sample into fractions of interest, usually 'green legume', 'dead legume', 'other dead' and 'other green'. Tweezers or forceps are useful for the sorting process.

Step 12

By weighing each fraction the percentage and yield (kg DM/ha) of each component is calculated. The

data sheet should be useful for recording the weight and proportion of each component. Pasture samples dried in an oven can be forwarded for laboratory analysis to obtain predictions of pasture quality, for example digestibility, energy and protein levels. Samples dried by microwave are unsuitable for laboratory analysis.

Acknowledgment

This Primefact appears as Appendix 1 in the PROGRAZE[®] Manual, which is a component of the PROGRAZE[®] course (contact your local NSW Department of Primary Industries office for details of this course).

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ISSN 1832-6668

Second edition

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (June 2007). 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.

Job number 7108



HERBAGE MASS CALCULATION SHEET

A. (Steps 1 to 5)

PADDOCK NAME: DATE: OBSERVER: Notes:	QUADRAT NUMBER	WET WEIGHT [g]
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
TOTAL		
AV. WET WEIGHT		g

B (Steps 6 to 9)

Weight of container																			
Weight of wet sample																			
Total																			
														Container					
														Dry weight					

$\text{DRY MATTER \%} = \frac{\text{WT OF DRY SAMPLE (g)} \times 100}{\text{WT OF WET SAMPLE (g)}} = \text{\%}$

C (Step 10)

$\text{HERBAGE MASS} = \text{AV. WET WEIGHT (g)} \times \frac{\text{DRY MATTER \%} \times 67}{100} \text{ kgDM/ha}$

D (Steps 11 & 12)

COMPONENT	DRY WEIGHT (g)	PERCENTAGE OF TOTAL %	HERBAGE MASS (kgDM/ha)
GREEN - LEGUME			
GREEN - GRASS			
GREEN - OTHER			
DEAD - LEGUME			
DEAD - OTHER			
TOTAL			
TOTAL LEGUME			
TOTAL GREEN			
TOTAL DEAD			