APPENDIX 1

MEASURING HERBAGE MASS – THE MEDIAN QUADRAT TECHNIQUE

The following is a step-by-step description of the median quadrat technique.

Equipment required

- 1.5 m × 0.5 m median quadrat. It is important that the dimensions are followed accurately (see Figure A1).
- Battery 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.

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 paddocks 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) 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 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 attached sheet can be used to record weights, then 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 calculate the pasture dry matter percentage, record the weight of the sample. 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:

a. 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.

b. Set the microwave to maximum power and dry for 5 minutes.

c. Weigh the sample, turn it over and loosen it (the sample tends to compact while drying).

d. Repeat steps (b) and (c) until the weight remains constant between successive weighings.

Then, to calculate the dry matter percentage (DM%), use the following formula:

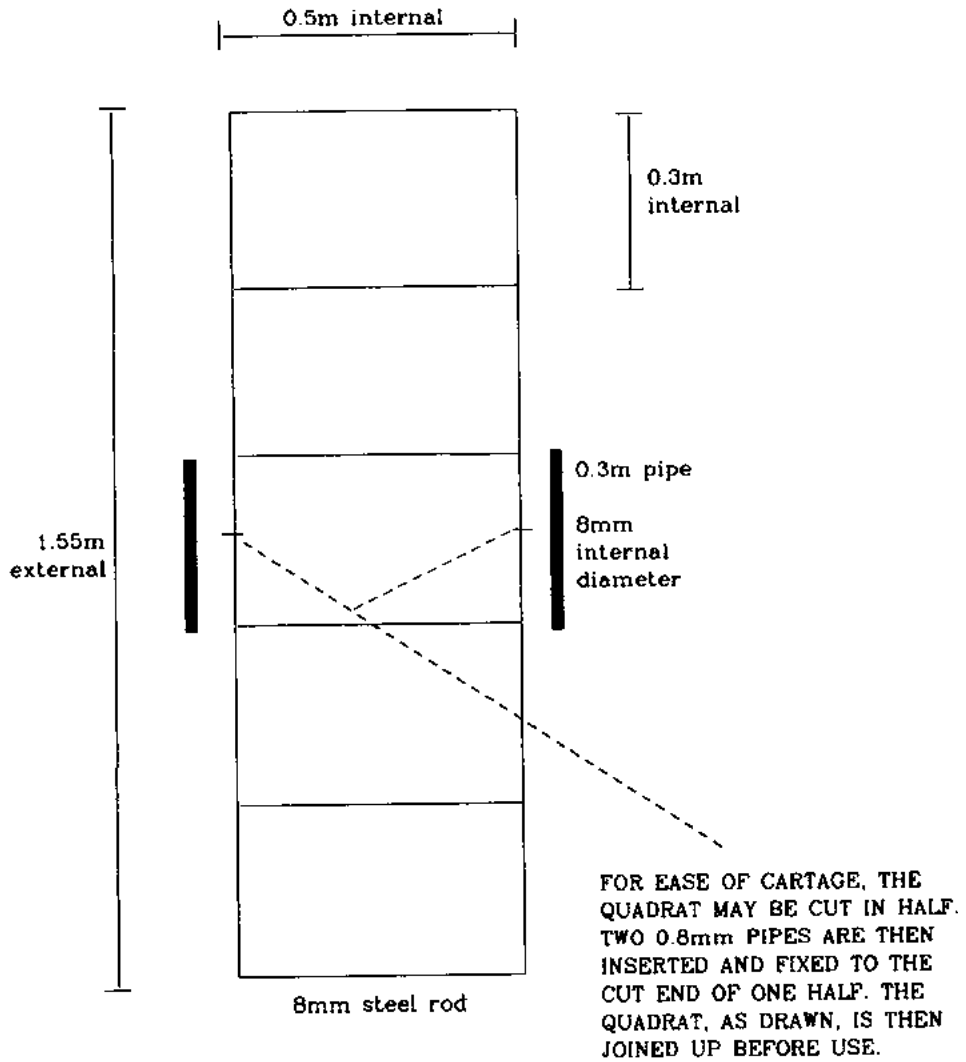
$$DM\% = \frac{\text{weight of sample dry (g)} \times 100}{\text{weight of sample wet (g)}}$$

Step 10. Multiply the average weight of herbage calculated in Step 5 by the DM percentage. Multiply this figure (in grams) by 67. To ensure this figure remains appropriate, dimensions for the median quadrat must be followed accurately. This will give kilograms of dry matter per hectare (kg DM/ha). This is your estimate of the herbage mass for the area being assessed.

Step 11. To obtain an estimate of pasture composition (percentage legume, percentage green and percentage 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 attached 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, e.g. digestibility, energy and protein levels. Samples dried by microwave are unsuitable for laboratory analysis.

Figure A1. Median quadrat.



Herbage mass calculation sheet

A. (Steps 1 to 5)		
Paddock name:	Quadrat number	Wet weight (g)
Date:	1	
Observer:	2	
Notes:	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	
	Total	
	Average wet weight	g

B. (Steps 6 to 9)									
Weight of container									
Weight of wet sample									
Total									

	Container	
	Dry weight	

Dry matter % = $\frac{\text{Weight of dry sample (g)} \times 100}{\text{Weight of wet sample (g)}}$ = %

C. (Step 10)
Herbage mass = Average wet weight (g) × $\frac{\text{dry matter \%} \times 67}{100}$ = kg DM/ha

D. (Steps 11 & 12)			
Component	Dry weight (g)	Percentage of total %	Herbage mass (kg DM/ha)
Green – legume			
Green – grass			
Green – other			
Dead – legume			
Dead – other			
Total			
Total legume			
Total green			
Total dead			