



# FACT SHEET

DECEMBER 2017

## MEASURING PASTURES ON HILL COUNTRY

Pasture mass (the amount of pasture per hectare; kgDM/ha) is assessed or measured to estimate how much feed is on hand to feed grazing animals. This fact sheet outlines simple tools and tips on how to measure pasture mass on hill country. The key thing to remember is you don't need to be perfect. Get out there and have a go, and keep doing it. Repeat measures over time.

## PASTURE MEASURING TOOLS

Accurate visual assessment of the amount of pasture dry matter in a paddock, based on pasture length, is an acquired skill gained from practice and should be supported by tools. It varies considerably from pasture type to pasture type, farm to farm and from season to season.

### CUT AND DRY

The gold standard for measuring pasture mass is cutting it to ground level and drying it. Representative sections of pasture are selected, and measured areas of these are clipped to ground level. Commonly, these quadrants are either 0.1 or 0.25 square metres (10 cm x 10 cm and 50 cm x 50 cm). Soil and dung should be removed from the samples by washing if necessary. Weigh the fresh sample and record it, then take a representative 200-gram sub sample for drying. Note if the total fresh sample is less than 200 grams it should all be dried. You can use your microwave for a simple quick at home method for drying grass. Place the weighed sub-sample (spread out) on a plate with a cup of water. Run the microwave (on high) for five minutes then immediately remove and weigh the sample. Put it back in the microwave for another two minutes before re weighing. Continue to cook at one to two minute intervals weighing each time until there is no change in weight. The sample will be crisp and dry like hay, but not charred.

### A WORKING EXAMPLE

You have clipped an area of grass (0.25m<sup>2</sup> or 50 cm x 50cm) and the fresh sample weighs 300 grams. A 200-gram sub-sample is dried, and its weight stabilises at 30 grams. The sub-sample is therefore 15% DM (dry weight divided by its fresh weight, expressed as a percentage).

A simple calculation works out the pasture mass (kg DM/ha):

$$\begin{aligned} &\text{Fresh weight (grams)} \times \text{Dry matter percentage} \\ &(\text{DM \% as a decimal}) \times 40 \text{ (to convert to kgDM/ha).} \\ &300 \times 0.15 \times 40 = 1,800 \text{ kg DM/ha} \end{aligned}$$

Multipliers to convert to kg/ha:

$$\begin{aligned} &0.25 \text{ m}^2 \text{ (50 cm} \times \text{50 cm)} = 1,000 \text{ g} = 1 \text{ kg,} \\ &\text{and } 40,000 \times 0.25 \text{ m}^2 \text{ (50 cm} \times \text{50 cm)} = 1 \text{ ha:} \\ &\text{Multiplier} = 40 \end{aligned}$$

$$\begin{aligned} &0.1 \text{ m}^2 \text{ (10 cm} \times \text{10 cm)} = 100,000 \times 0.1 \text{ m}^2 = 1 \text{ ha:} \\ &\text{Multiplier} = 100 \end{aligned}$$

Farmer comment: This process is the most accurate for assessment but it can be time consuming. Use of the kitchen microwave is not recommended!

### PLATE METER

The rising plate meter measures a pastures height and resistance to compression. It's the tool of choice for the dairy industry as it is low tech, easy to use and takes into account seasonal variations, and paddocks tend to be flat or easy rolling. It works by measuring the height from the top of the grass to ground under a certain pressure (the plate).

The change in meter reading is used to calculate average daily pasture growth rate. A multiplier of 157 should be used all year round and on all pasture types.

For example:

$$\begin{aligned} &\text{Meter reading 1 May} = 4 \text{ cm} \\ &\text{Meter reading 16 May} = 10 \text{ cm} \\ &\text{Difference} = 6 \text{ cm} \\ &\text{Pasture growth rate: } 6 \times 157 / 15 \text{ days} \\ &= 63 \text{ kgDM/ha/day} \end{aligned}$$

Farmer comment: Plant it straight down and straight up. Don't swing it or roll your hand forward. Don't be biased where you plant it, put it down every fourth step. It works well on flats but on rough uneven hill country with pugging and sheep tracks its accuracy can be compromised.

## PASTURE PROBE

The pasture probe measures the electrical capacitance of the pasture, an indicator of its surface area and therefore its mass. The changes in probe reading are used to calculate average daily growth rate.

For example:

Probe pasture mass reading 1 May  
= 1,500 kg DM/ha

Probe pasture mass reading 16 May  
= 2,000 kg DM/ha

Change in meter reading = 500 kg DM/ha

The change in the probe reading is then multiplied by a factor to get seasonally adjusted change in mass. For example, pasture growth rate in April to June:  
 $500 \times 0.85 / 15 = 28 \text{ kg DM/ha/day}$ .

Different multipliers should be used for different months because pasture quality varies throughout the year.

**Table 1:** Multipliers for Grassmaster 11 Pasture Probe, according to season.

	Multiplier
October to December	1.22
January to March	1.77
April to June	0.85
July to September	0.84

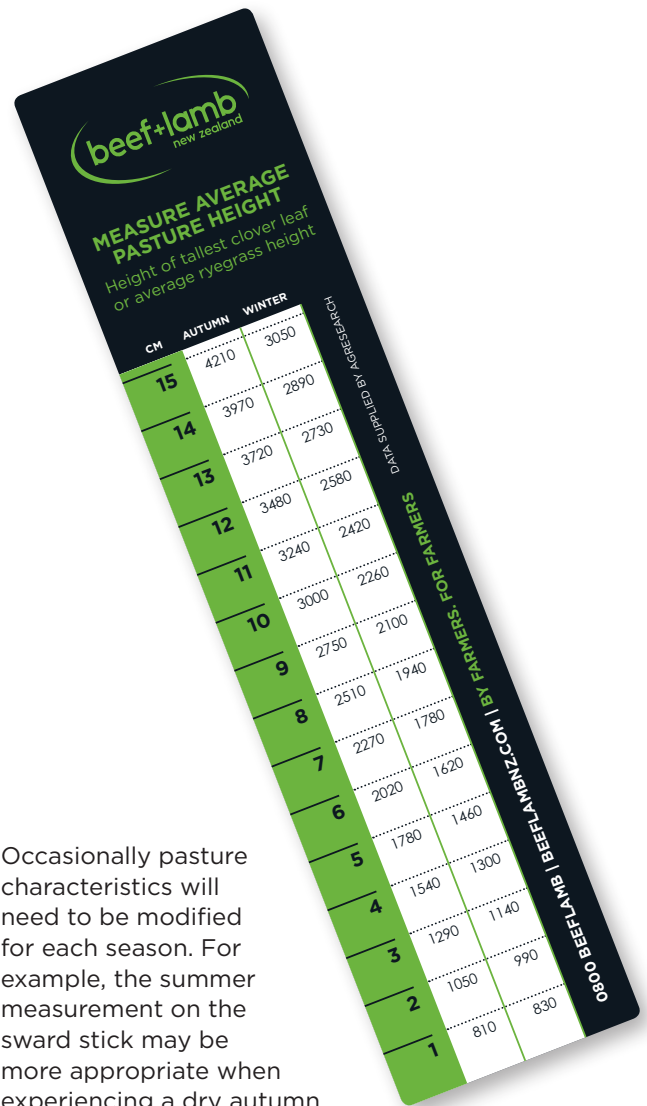
They cost approximately \$1500-\$2000 but come with some features. Paddock measurements can be downloaded straight to your computer saving time and input errors. They can be calibrated for different crops and pastures also.

Farmer comment: Keep it away from your feet and keep it upright. Again don't be biased where you put it, put it down every fourth step. They don't work particularly well in wet conditions with wet paddocks measuring higher than dry ones. To combat this, you can use dispersant oil to measure in wet conditions.

## SWARD STICK

The sward stick is the cheapest and most versatile tool. It measures pasture height, is calibrated to provide estimates for each season and can be applied across all of New Zealand. Measure the height of the tallest clover leaf or the average ryegrass height to determine the average height of the sward. Alternatively, lay a flattened hand, light folder or book over the sward and measure the pasture height when you feel resistance.

Pasture mass in relation to height varies each season. Table 2 (right) defines which season to use relative to visual characteristics of the sward.



Occasionally pasture characteristics will need to be modified for each season. For example, the summer measurement on the sward stick may be more appropriate when experiencing a dry autumn and pasture contains predominantly dead material and minimal green leaf.

Farmer comment: "It's quick and easy and can be done as a part of your daily activities. The biggest downside is that it requires a bit of interpretation but it is this interpretation that makes it more accurate. Make sure the same person does it each time and make sure your 'eye-ometer' is consistent; regularly checking that your visual estimate aligns with the sward stick".

**Table 2:** Identifying which season to measure.

Season	Visual sward characteristics
Spring	No seed head Green and leafy
Late Spring	Substantial seed head
Summer	Dead material present Large amounts of seed head
Autumn	Fresh green material emerging Reasonable dead material at base of sward
Winter	Pure sward of grass

## TIPS TO GET YOU STARTED

- Just measure it—the most common barrier to farmers measuring pasture covers is a view that every blade of grass needs to be accounted for and fear they aren't doing it right. Make a start and just get out there, measure some grass and take an objective view on your average pasture covers.
- Use a tool—the “eye-ometer” is fastest but make sure you calibrate it with one of the tools above for the best results.
- The pattern of growth needs to be measured in areas representative of the main land types (e.g. hills, flats).
- Be realistic—taking 50 measurements in every paddock of your farm is ideal but not realistic. If you take too many it takes too long. You will become frustrated and the simple task will be put in the too hard basket. Measuring 50% of your paddocks is about right. After this the farm average doesn't change too much (as long as you don't just measure the paddocks with the most grass in them).
- Record it—if you are making the effort to measure pasture covers monthly, then record it so you can reflect back on it future years.

## FARM AVERAGES

Individual paddock measurements are useful, but real value comes when your group blocks together or calculate whole farm averages. The most fool proof way is to attribute a pasture cover to every paddock (even if you haven't measured it) and use the following calculation (represented with examples in Table 3).

If you do this for every paddock you need to add all the total paddock DM figures up and then divide by the total of the paddock areas.

To increase the accuracy of your whole farm estimate, the key is to attribute specific covers to specific areas. Below (Table 4) is an example where you have four blocks and you have measured a few paddocks in each to give average areas in those blocks.

You need to work out the individual block DM first to account for differences in block size and pasture covers.

**Table 3:** Paddock area x Paddock cover = Total paddock DM.

Paddock	Area (ha)	Covers (kgDM/ha)	Total Paddock DM
Tank Paddock	10.6	1,600	16,960
Road 1	14.2	2,500	35,500
Road 2	18.6	1,100	20,460
Road 3	14.7	1,150	16,905
Road 4	10.2	1,250	12,750
Gully Paddock	12.3	1,250	15,375
Ram Paddock	7.2	1,450	10,440
<b>Total</b>	<b>87.8</b>		<b>128,390</b>

**Average cover = 128,390 / 87.8 = 1,462 kg DM/ha**

**Table 4:** Block area x Block cover = Total block DM.

Block	Area (ha)	Covers (kgDM/ha)	Total Block DM (kgDM/ha)
Road Blocks (1-4)	57.7 ha	1,483	57.7 x 1,483 = 85,569
Ewe Rotation	425 ha	1,250	425 x 1,250 = 531,250
2th Rotation	215 ha	1,475	215 x 1,475 = 317,125
Hoggets	177 ha	1,610	177 x 1,610 = 284,970
<b>Total</b>	<b>874.7 ha</b>		<b>1,218,914 DM</b>

**Average farm cover = 1,218,914 / 874.7 ha = 1,393 kg/Dm/ha**

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## B+LNZ RESOURCES

[www.knowledgehub.co.nz](http://www.knowledgehub.co.nz)

### Further reading to download:

- *Sward stick fact sheet*: This fact sheet provides guidance on using this simple tool to measure pasture height.
- *FeedSmart app user guide*: How to download and use all the features of this valuable app.
- *A guide to feed planning for sheep farmers*: A comprehensive booklet covering all aspects of feed planning including feed nutritional values and pasture production data from sites across New Zealand.

## ADDITIONAL RESOURCES

*Sward stick*—to request a sward stick, email: [resources@beeflambnz.com](mailto:resources@beeflambnz.com).

*Pasture Growth Forecaster*: A tool to predict pasture growth rate differences using climate data. Available to download under 'data & tools' at: [beeflambnz.com/data-tools](http://beeflambnz.com/data-tools).

*FeedSmart app*: A feed planning tool for sheep and beef farmers—available to download for free at [www.feedsmart.co.nz](http://www.feedsmart.co.nz).

*FeedSmart workshop*: A feed planning programme which aims to assist sheep and beef farmers to better manage feed supply and demand, increase feed utilisation and enhance the value of feed consumed. Contact your local B+LNZ Extension Manager to see when a workshop is available in your area. Visit: [beeflambnz.com/contact-us](http://beeflambnz.com/contact-us).

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