1-15 Using the Rising Plate Meter (RPM)

The Rising Plate Meter (RPM) is a farm management tool that is used throughout New Zealand Pastoral farming to measure perennial ryegrass/white clover swards.

**Caution**

The RPM is a farm management tool that approximates pasture mass. It should not be used as the only method to allocate pasture to stock. Allocation of pasture should be made with the following considerations:

- Observation of stock that they are grazing for sufficient time
- That post grazing residuals are hitting the desired targets

**The benefits of the RPM are:**

- Able to quantify pasture on farm (Average Pasture Cover)
- Correctly and consistently target a consistent pasture height
- A tool that almost anybody can use

When used in conjunction with regular farm walks the RPM can be a vital cog in pasture management decisions. The data collected can also generate valuable information for future farm management decisions. The data collated can provide:

- Annual farm growth rates
- Individual paddock growth rates
- Seasonal average pasture targets
- More accurate information for feed budgets
- Information to build a feed wedge

**Key points when using the RPM**

- The RPM measures height not kilograms of dry matter (kg DM)
- The equation that converts height to kg DM should be seen as a guide
- Maintenance is critical to ensure accuracy and reliability of reading
- Operators technique needs to be consistent
- Adverse environmental conditions will impact on accuracy
What does the Rising Plate Meter measure?

The RPM measures the compressed height of pasture. Each of the 'clicks' represents 0.5cm of compressed height i.e. a reading of 7 "clicks" represents a compressed pasture height of 3.5 cm.

<table>
<thead>
<tr>
<th>The RPM equation</th>
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<tbody>
<tr>
<td>&quot;Average compressed pasture height&quot; x 140 + 500 = kg DM/ha</td>
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<tr>
<td>Readings from RPM x the multiplier + the adder = kg DM/ha</td>
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Understanding the equation

The equation changes the compressed height (i.e. "clicks") to a kg DM/ha. This equation is a 'guide' and not an absolute measure of quantity as the DM composition will change due to seasonal variations.

The "Multiplier" (e.g. x 140) relates to DM % in the pasture. The "adder" relates to the amount of the pasture sward that is unavailable (e.g. + 500) i.e. when the plate meter reads 0, the amount of pasture between the ground and the plate.

Range of the multiplier:

115 when grass is growing the fastest (e.g. low DM)
140 this is about the average (so best fit for the whole season)
185 used in very dry conditions of slow growth e.g. drought, frost (higher DM)

Use one equation for simplicity and convenience

The equation of "average compressed height x 140 + 500" is the best fit for most situations and makes the data produced the easiest to understand.

Achieving consistent grazing height is the key to offering cows high quality pasture at every grazing. One of the main benefits of the RPM is that it accurately assesses post grazing heights. In the past, target grazing residuals have been communicated to farmers in kgs DM/ha with different targets throughout the year, but as the line representing RPM height in Figure 1 below shows, the actual grazing height changed little. This lead to a lot of confusion with farmers lifting post grazing height and losing quality when the post grazing height should actually be consistent through out the year at 7 - 8 clicks on the RPM for ryegrass/clover pastures.

Therefore height is the preferred method to express grazing residual targets as it eliminates the confusion created from having different targets for different months of the year and changing the plate meter equations.
When taking readings during the farm walk the following will need to be considered to ensure consistent measurement:

- Avoid gateways, troughs and fence lines
- Ensure the walk gives a fair representation of the paddock. To do this either walk diagonally across the paddock or walk a "w" within the paddock
- The readings should be random and not biased by the operator looking where to place the RPM. A guide is to take a reading every 2-3 steps.

**Adverse Weather Conditions**

Weather conditions can impact on the accuracy of the RPM. In extreme conditions postpone the walk until conditions improve. Factors to consider under different conditions:

**Ground frost**
- Do not plate the farm when the pasture is still frosted, wait until it has lifted
- If the soil is frosted apply pressure to the shaft to break the standing ice crystals so that the bottom of the shaft reaches the soil surface

**Windy conditions**
- Strong wind conditions will compress long pasture resulting in lower readings

**Heavy Rain and wet conditions**
- In wet conditions water can accumulate on the plate. This accumulation of water increases the weight of the plate and results in lower readings. Regularly shake the plate to remove any surface water.
- After heavy rain pasture can also be 'compressed' resulting in a lower height reading
- Avoid areas of surface water as the RPM will give inconsistent readings

**Snow**
- A snow fall on pasture will "compress" the pasture resulting in lower height readings

**Avoid other pasture or weed species**

The RPM has been calibrated for perennial ryegrass/white clover swards. Different pasture species (e.g. Fescue, Kikuyu) will give different readings, as the physical composition of the plants is significantly different.

Weed species such as thistles, buttercup and wire weed need to be avoided as they cause the RPM to read "high" as they hold the plate above the ground. If paddocks have been topped in previous rounds beware of topped areas that contain weed stems. Often the weed stems are very hard and woody and create an 'artificial' residual for the RPM.

**Pugged paddocks**

The RPM will not give an accurate assessment of pasture cover in badly pugged paddocks. Visual assessment should be used after calibrating the "eye" using the RPM on paddocks that have not been pugged.
Figure 1: Ruakura No2 Grazing Residual Targets Expressed as kg DM/ha and Height (RPM clicks)

Ruakura No2 Grazing Residual Targets

Maintenance of the Plate Meter
To ensure the RPM gives consistent readings, routine maintenance needs to be carried out. Refer to the manufactures guidelines. The main problems associated with the RPM are:

- Corrosion on the shaft
- Grass and mud build up on the plate and shaft
- Poor wheel alignment in the shafts grooves
- A bent shaft
- Flat batteries (Electronic RPM)

Check the operation of the rising plate meter prior to commencing the walk for:

- Charged battery (if using electronic meter)
- Freely moving shaft and correctly aligned cog
- A clean plate free of grass and mud

Once the farm walk has been completed ensure the RPM is clean and dry and stored correctly.

Operator technique and procedures
Incorrect operator technique will cause inaccurate readings of the RPM. The main operator problem is extra pressure applied to the RPM when taking a measurement. The RPM has been calibrated with the plate falling under its own weight. By creating extra force (slamming the plate down or using the RPM as walking stick) the plate falls faster and the shaft can be pushed below the soil surface.

Rolling the RPM when taking a measurement generally does not affect the measurement unless it is very pronounced.
Two Questions to ponder....

What's wrong with my eye?

- Nothing - But you are the only one that can interpret the data!!
- Cannot rank paddocks in order "accurately"
- Cannot get information on paper for all to see

Why develop a machine to measure pasture?

- Simplify pasture measurement
  - Any Person, Any time, Any weather
- Removing the human factor (error) from sampling
- Produce data that is accurate and repeatable
Technical

200 Readings per second

- 18,500 readings (at 20kph) over a 500m distance

Measure pasture at 20kph

- Measure pasture cover quickly

Measure height or kgDM/ha

- On-board indicator console set to display either grass height or kgDM/ha

Record and download information via Bluetooth

- Farm ID, Paddock ID, Height (mm), kgDM/ha, calibration factors
Options Available

Making a system that fits your system

Tier 1
- Simple start stop operation
- Manual data entry
- Introductory feed management software

Tier 2
- Added farm and paddock ID
- On-board field data storage
- Wireless link to PC
- Download to P-Plus of Excel

Tier 3 (on trial)
- Equipped with GPS unit to create pasture growth/utilisation maps
- Figure out: Pasture utilisation, Fertiliser efficiency, Stocking rate intensities
- Will take time to use information to full potential
Data and decisions made using Pasture Meter

10/09/2008 Feed Wedge

Decisions made
- On target line
- Dry cows grazing longer paddocks
- Slight surplus identified in next round, check at next measure

pasturemeter
Rapid Pasture Measurement System
Data and decisions made using Pasture Meter

20/09/2008 Feed Wedge

Decisions made
- Genuine surplus identified
- Decision made to drop out paddocks for silage if above target level at grazing
- Two paddocks of dry cow feed left
Data and decisions made using Pasture Meter

1/10/2008 Feed Wedge

Decisions made
- 8 paddocks shut for silage
- Continue to drop out paddocks (up to 28 ha)
- Moved to weekly measurement (growth erratic)
- Cows lifted in production after dropping out longer paddocks (better quality feed)
Calibration of pasture meter

DairyNZ/ AgResearch Project
- Nationwide
- Both Dairy and sheep and beef
- Single formula or monthly formulas?
- Run by Dawn Dalley (DairyNZ) and Robyn Dynes (AgResearch)

DIY Calibration kit
- Gives people the tools to calculate their own calibration factors for their own farm
- Can be used to correlate to Plate meter, experienced visual estimator or pasture cuts

Pros
- People are used to the numbers they get from their old technique

Cons
- Reduces the ability to benchmark between farms using different formulas.