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12/09

Filip's Electronic Folding Plate Pasture Meter

EC-09 User Manual



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FILIP's ELECTRONIC FOLDING PLATE PASTURE METER

Introduction

Congratulations on the purchase of your *FILIP's Folding plate pasture meter*. This meter is a high precision engineered device for measuring the average height of pasture relative to density of the pasture. This is directly relative to the quantity of dry matter present (Kilograms of dry matter).

Learning to operate your *FILIP's Folding Plate Pasture Meter* won't take long. You will soon find it to be an invaluable tool in your farming operation for day-to- day feeding decisions and long term feed budgeting

Please retain this instruction book for future reference. You will need it regularly

Important Safety Note

Read and understand all the instructions before using the meter.

- Your meter is designed only for measuring pastures. Use it for no other purpose (e.g. it is not a walking stick). We have manufactured the meter using quality materials and manufacturing techniques however if faults do occur please have them corrected before you use the meter.
- Be careful around electric fences. Parts of the meter will conduct electricity.
- Store the plate correctly. Be careful that the wind does not blow a plate away - it could be dangerous. It is not to be thrown.

Conditions of Sale and Guarantee

Your JENQUIP product is guaranteed to be free from defects in materials and/or workmanship under normal use and service for a period of 6 months from date of initial purchase.

JENQUIP'S liability and obligation is limited to problems which *JENQUIP* acknowledges to be defective under the guarantee conditions either to

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- or shipment of replacement parts to the customer, as mutually agreed to.

Supply of non standard parts or services from other than *JENQUIP* are not covered under the guarantee conditions unless prearranged, in writing, with *JENQUIP*

Shipment of product to *JENQUIP* is the consumers responsibility and cost
Guarantee conditions are void for any of the following reasons:-

- Abnormal use of the product
- Accident damage or vandalism
- Modifications or unauthorised repairs to the product or its components
- Where component "seconds" have been supplied
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Notes

Page	INDEX
3	How to Assemble the FILIP's Folding Plate Pasture Meter
5	How to Dismantle and Transport Optional Extras
6	Operating the Electronic Counter
7	Zero Calibration
8	Formulas
11	Using Your Plate Meter
12	Taking Paddock Readings "The Farm Walk"
13	Maintenance
14	Replacing the Battery Fault Finding
19	Addendum - Cutting Quadrats
20	- Conversion Factors
21	- Supplementary Feed Values
22	Notes

How to Assemble the FILIP's Folding Plate Pasture Meter

Your meter is supplied in three parts :

-The Carry Bag. Used for storing or transporting the meter around

-The Plate.

This light-weight circle of anodised aluminium sits on the top of the pasture to establish average height & density. The area of the circle and weight of the plate have been carefully calibrated to researched data.

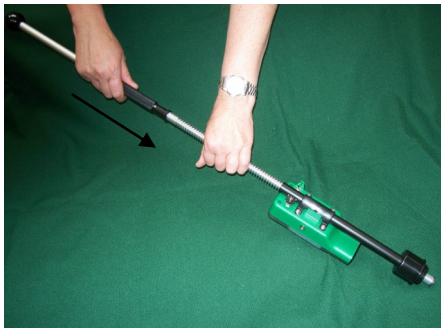
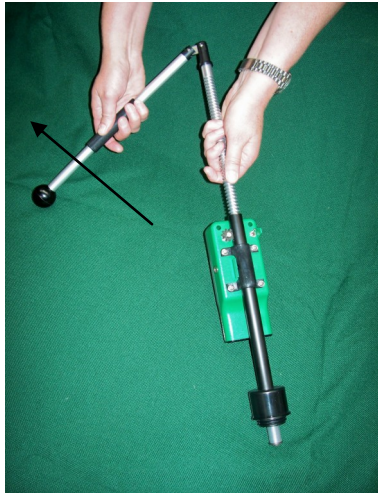
-The Folding Handle /Shaft.

Also generally referred to as "the meter". A unique design allows this meter to fold into an easily carried tool.

The grooved part allows pasture to be measured in ½ centimetre Intervals (clicks).

To Assemble

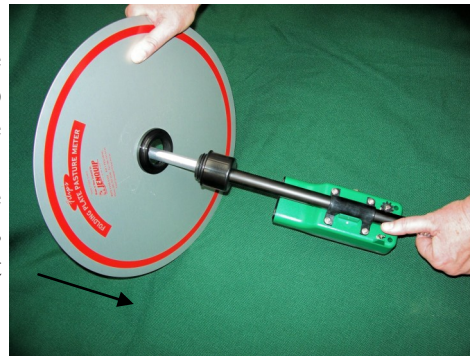
- Hinge the handle to an upright position



- Slide the hinge lock tube over the hinge assembly

-Holding the meter by the grooved area, slide the tube assembly 50mm up the shaft and retain it with your thumb. With the other hand offer the plate (printed side first) up to the meter and thread the two together.

It is important that the printed side of the plate is upper most or incorrect readings will result.



C/. SUPPLEMENTARY FEED VALUES

1 cubic metre of silage averages 800 kg (0.8 tonne). To estimate DM content of silage, twist the silage in your hand to see how easily the juice is expressed.

- If juice easily expressed by hand, DM below 18%
- If juice expressed with difficulty, 18-22%
- If little or no juice expressed but hands moist, 22-27%

Silage - Hay conversions

- 1 tonne direct cut silage = 9 bales hay
- 1 tonne wilted silage = 15 bales hay
- 1 tonne maize silage = 14-15 bales hay

Hay

Conventional bale of hay weighs 20-25 kg. A 25 kg bale has the approximate equivalent feeding value of:

- Two 14 kg bales of barley straw
- 120 kg direct cut silage
- 70 kg wilted silage and maize silage
- 16 kg barley meal
- 14-16 kg of pasture DM

oven to prevent arcing which otherwise could occur as the sample dries out. Drying time depends on the size of the sample but is usually less than 15 minutes.

- Once the sample is dry it is then weighed. If your sample area was 0.1 m² then

$$\text{Weight (gms)} \times 100 = \text{Kg DM / ha}$$

The more quadrats you cut in a paddock the better will be your result. Typically 3 to 5 samples per paddock are taken.

DERIVING THE FORMULA

Although a long hand mathematical calculation can be used to derive the formula, the easiest method is to use a programmable calculator capable of regression analysis. The "average" pasture height reading is graphed against actual dry matter measured.

B/. CONVERSION FACTORS

- Hectares x 2.471 = Acres
 - Acres , 2.471 = Hectares
 - 1 Hectare = 10,000 square meters
 - Kilograms x 2.205 = Pounds
 - Kg DM 1 Ha x 0.892 = lbs DM / Acre
- $$(\text{lbs DM / Acre / day}) = \frac{\text{Final lbs DM / Acre} - \text{Initial lbs DM / Acre}}{\text{Number of days between Samples}}$$

To Disassemble and Transport

This is the reverse of the assembly process. **Never hold the counter when fitting or removing the plate!** Remove the Plate and insert in the carry bag pocket. Fold the pasture meter in half and insert into the carry bag.



Optional Extras

- A **Carry Bag** which can be mounted on your farm bike or utility is available to safely store the meter. This ensures the meter is protected yet always available to use. The carry bag is particularly useful where the meter needs to be transported between farms.
- **Pasture Management Software.** Not essential but if you have a computer the software simplifies the feed budgeting process. This is a very simple easy to use programme. It takes the information from your farm walk and produces ready to use reports . Computer requirements :
 - Version 3 Windows 3.1, '95 or XP
 - Version 4 Windows XP or later
- **All Weather Note Books.** A notebook is supplied with your meter but others can be ordered. These are pre printed for recording your farm walk readings. Biro pen or pencil can be used. We recommend pencil in wet weather. Pencil can also be rubbed out and the pages reused. Pages are perforated so they can be removed and used or filed in the office. The reverse of each page can be used for general notes - a great asset to carry in your pocket for any purpose!

Addendum

OPERATING THE ELECTRONIC COUNTER

Switching On and Off

The Electronic Plate Counter is switched on and off using the toggle switch at the back of the unit. Off is in the 'up' position. When the unit is off there are no numbers displayed on the LCD screen.

The Front Display Buttons

The various functions of the EC09 are accessed by the two buttons on the front of the unit, labelled '**Height/Reset**' and '**Count/Formula**'. The wordings in bold type are the primary functions. These are activated by a short press of the button. The secondary functions 'Reset' and 'Formula' are activated by holding the button down until the function operates. When the unit is first switched on the display will show the current formula in use and the calculated **kgDM/ha** based on that formula, and any readings in memory. Pressing the "Height" button will briefly display the **Average pasture height**. This is often referred to as "clicks" (measured in 0.5cm) and will be displayed to one decimal place (i.e. 0.0 or 12.4).

Note: 1 click= 0.5cm

The **number of readings** is displayed when '**Count**' button is pressed. The display will show a 'c' on the left side and the **count** on the right. The display will return to normal after 2 seconds.

All readings can be cleared (reset) by holding down the "Reset" button for approximately 2 seconds, then the display will change to "0".



A/. CUTTING QUADRATS

To calibrate the meter you must first know exactly how much pasture is in the paddock. Cutting quadrats is the traditional scientific method of measuring dry matter, used almost universally for decades. Once the amount of Kilograms of Dry Matter (KgDM) are known then this can be compared with the readings obtained from the *FILIP's Folding Plate Pasture Meter*. A formula converting the meter readings to actual KgDM / hectare can then be arrived at.

Cutting Quadrats This involves sampling a number of quadrates (small areas) per paddock. There are variations of this method but a common version is described here:

- Make a template out of ½" steel rod, plywood sheet or similar stiff material. For longer pastures a "box" with no bottom works well. This can be any shape but the area of the hole in the template must be known. We recommend a template with a hole measuring 20cm x 50cm (ie. 0.1 m²).
- Firstly using the plate meter, measure where the pasture is typical of the rest of the paddock.
- Now place the template in the sample area. Using shears or clippers, cut and collect all the pasture within the template right down to the soil level.
- Wash the sample to remove any soil or dung contamination. (Place the sample in a 20 litre bucket, turn a high pressure hose on it until the bucket is ¾ full. Pick any floating dung out of the bucket by hand and pour the water through a sieve or colander, catching the grass in the process but taking care to leave any lumps of soil in the bottom of the bucket. Repeat with a second rinse if necessary, and leave the colander to drain for a few minutes.
- Drying the sample. This can be done in a standard oven provided it is set on the lowest setting, 60 to 80° C, and the oven door left open to let the moisture escape. Check with the cook first as this will generate a smell in the kitchen ! Drying time is overnight.

Over drying is a possibility so be consistent with your procedure. Alternatively a microwave oven can be used. They have limited capacity so only small samples can be dried at a time. Leave a glass of water inside the

How do I enter my own formula?

Check	Resolution
The EC09 is switched on.	<p>Hold down the 'Formula' button until the display changes to 'F d'. Press the 'Formula' button again to change the 'd' to a 'c'. Now press the 'Reset' button and the display looks like '0 _ _ _'. The display will then show you the first of two numbers you will enter. The first number is the equation 'add' number and the second the 'multiply' number. For example in equation 1 above, the first number (140) is the 'multiply' number and the second (500) is the 'add' number.</p> <p>b. The 'add' number is 4 digits long and can range from 0 to 9999. Press the 'Formula' button to change this digit to a value between 0 and 9. When it is correct press the 'Reset' button. Enter the next digits the same way. Repeat this process for all 4 digits until the display changes to the 'multiply' number. NB: (500) would be entered as (0500)</p> <p>c. The 'multiply' number has 3 digits and can range from 0 to 255. Enter the first digit by pressing the 'Formula' button to change this digit to either 0, 1 or 2. Press the 'Reset' button when it is correct and continue to the next digit. Repeat this process until all digits have been entered and the display returns to its normal state.</p>

If you are having problems, require assistance or spare parts please contact :

JENQUIP

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We trust your meter will give you many years of valuable service and we are sure you will find feed budgeting to be very beneficial.

Zero Calibration

To ensure the Plate Meter accurately measures the compressed height of pasture, the counter must be calibrated. This requires setting a base level of zero so measurements can be benchmarked against this. If the counter does not return to zero after each "plonk" it will not record the measurement - hence the counter will not beep. If the counter is removed from the black tube or receives a severe knock it may jump a groove on the steel shaft which will put the counter out of calibration. It will need to be reset.

To do this, work through the following steps:

1. Ensure the plate is fully down (place on a firm flat surface) and the unit is switched off.
2. Hold down the 'Count' button while switching the unit on. The display will change to 'CAL' briefly and display a colon ':' followed by a number. Let's assume you see ': 5' when you switch on. Proceed as follows.
3. The colon signifies that it is in fine calibration mode. Use a flat blade screwdriver and turn the blue plastic or steel shaft within the cog, anticlockwise until the display reads '0'. NB: The cog and steel shaft must remain stationary. **DO NOT TURN THE SHAFT BEYOND THIS POINT OR YOU MAY DAMAGE THE POTENTIOMETER!** Once the counter reads zero, move the counter up the full length of the shaft. The colon will disappear once it passes 9 and enter 'clicks' mode. At full height the display should read approximately '52', which is 52 half centimetres. The counter has now been calibrated successfully.
4. Switch off when you have finished, and then back on again without pressing any buttons.
5. Test the zero calibration by raising and lowering the plate several times. A beep should sound and the kgDM/ha displayed as the plate falls. If it does not, repeat the steps above and retest.

If the calibration fails to hold then the potentiometer, which the cog drives is probably faulty and will need replacing. This can occur with excessive wear often compounded by dust and dirt entering the dry bearing of the potentiometer.

Start up/Self test

Switch on. The counter will beep and display the current formula setting. The formula will be displayed next with the '+' part of the equation first (default 500) and then the 'x' part second (default 140)

The display will then show the kgDM/ha calculation based on that formula and any readings stored in memory.

To clear the readings, press and hold the 'Reset' button until the display shows '0.0' There is one default plate equation, and one custom (user editable) equation. The former is built into the chip and cannot be replaced or modified. This equation is typically used between April and September in New Zealand.

During start up if the battery charge is low it will display "Lo" and give 2 beeps. It will still work OK for quite some time. However it would be a good idea to take a spare battery with you on the farm walk.

The original formulas developed for use with the plate meter were:-

Dairy Pasture (Reasonably consistent rainfall areas (Taranaki)
 $\text{height reading} \times 158 + 1000 = \text{Cover (kgDM/ha)}$)

Dairy Pasture (moderate rainless periods (Manawatu, Waikato etc)
 $\text{height reading} \times 158 + 200 = \text{Cover (kgDM/ha)}$)

Sheep pastures: $\text{height reading} \times 158 = \text{Cover (kgDM/ha)}$

The counter also provides an option for selecting your own equation or those recommended by consultants, DEXCEL or Meat & Wool. When you receive your counter it will normally be setup for the DEXCEL recommended equation for the autumn/winter months

ENTERING THE FACTORY DEFAULT FORMULA.

While the EC09 is switched on, hold down the 'Formula' button. The display looks like this 'F __ d' press the 'Reset' button briefly. The display will then show (500) and then (140). The default formula has now been loaded and saved to memory.

OTHER FORMULAS

To better reflect the growth stages of pastures these formulas were derived:-

Plate Meter not running freely (Low results)

Check	Resolution
Metal shaft is bent.	Straighten or request a replacement part from Jenquip
Grass or soil build-up inside the black tube.	Clean the Plate Meter.
Flutes on steel shaft have become filled with grass or soil.	Clean the Plate Meter.

Front Panel (membrane) problems

Check	Resolution
Buttons not clicking or activating.	Service - membrane needs replacing. Send to Jenquip for service and repair.

Battery Retainer keeps falling out

Check	Resolution
The counter screws have not been tightened sufficiently.	Ensure the battery retainer is properly clicked into place and make sure the centre screw is re-tightened after the battery is replaced.

How do I change a formula?

Check	Resolution
The EC09 is switched on. If you wish to select the inbuilt default formula.	Hold down the 'Formula' button until the display changes to 'F d'. While the 'd' is displayed, press the 'Reset' button. The following equation is used: $\text{Cover (kgDM/ha)} = 140 \times \text{height} + 500$

Cog becoming worn

Check	Resolution
Not aligned correctly on the shaft.	Re-align the cog or replace the cog Order from Jenquip

Counter Readings do not seem accurate

Check	Resolution
The counter is like a calculator - it does not give false readings under normal circumstances.	Check the equation being used is correct and the calibration has been correctly set. (zeroed)
<p>Cover Equations</p> <p>In New Zealand there are a number of standard equations published by various organisations. These reflect regional pasture types. If you wish to change an equation or select alternative species you will need to contact your consultant. Traditionally the equation of height X 158 plus 200 was used however there has been a series of equations produced to reflect changes in pasture types and physiological state (vegetative, flowering, seed head) which can alter DM levels in the paddock.</p> <p>A more accurate calibration can be achieved by taking cuttings or your consultant may be able to advise you on the most appropriate equation for your situation. This particularly applies to pastures under irrigation.</p>	Check what equation you are using.

SEASONAL VARIATIONS OF FORMULAS

- 1 Winter and early Spring x 125 + 640
- before stem growth
- 2 Late Spring and early Summer x 130 + 990
- during stem growth
- 3 Mid Summer x 165 + 1480
- 4 Early Autumn x 159 + 1180
- before Autumn rain
- 5 Late Autumn x 157 + 970
- after rain

DEXCEL also developed these “month based” formulas:-

Months	Rising Plate Meter Equations
	Dairy Pastures
Winter (April-Sept)	Plate Meter Reading x 140 + 500 (Factory Default)
October	Plate Meter Reading x 115 + 850
November	Plate Meter Reading x 120 + 1000
December	Plate Meter Reading x 140 + 1200
January	Plate Meter Reading x 165 + 1250
February	Plate Meter Reading x 185 + 1200
March	Plate Meter Reading x 170 + 1100

Equations may change without notice and are influenced by seasonal differences. If you are unsure of the current equation contact Dexcel or your local consultant.

Entering your own formula.

To enter your own cover equation or one that may have been recommended by a third party such as your consultant or Dexcel please do the following:

1. While the EC09 is switched on, hold down the 'Formula' button. The display looks like this 'F__d' Press the formula button again briefly the change the 'd' (default) to 'c' (custom). Now press 'Reset' briefly and the display will look like this: '0__-'
This is the first of two numbers you will enter. The first number is the equation 'add' number and the second the 'multiply' number. For example in equation 2 above, the first number (115) is the 'multiply' number and the second (850) is the 'add' number.
2. The 'add' number is 4 digits long and can range from 0 to 9999. Starting with the first digit, press the 'Formula' button to change this digit to a value from 0 to 9. Press the 'reset' button when it is correct. NB: 850 for example would be entered as (0850). Enter the next digit. Repeat this process until all 4 digits have been entered. The display then changes to the 'multiply' number.
3. The 'multiply' number has 3 digits and can range from 0 to 255. The first digit will appear. Press the Formula button to change this digit to a value of '0, 1 or 2' Press the Reset button when it is correct and the next digit will appear. Repeat this process until all digits are entered and the display returns to its normal state.

As manufacturers we can only give broad guidelines with regard to the formula to use.

So Which Formula Should I Use?

We say if you are comparing results with a neighbour, a discussion group or an adviser then you are probably best to use a similar formula to them. A lot of Farmers don't compare with others and only use the Dry Matter values for their own use. In this case select an equation relevant to the pasture growth stage.

Still unsure as to which equation to use, suspicious of your findings or having a disagreement with others? The answer is to cut, dry and weigh a sample. We

NOTE: Most problems are due to the counter being out of calibration (see following points as to why. If in doubt it is worth Zero Calibrating just to make sure it is correct (see page 7).

The counter does not "beep" when taking a reading

If it doesn't beep this means the counter does not know where the bottom is - therefore does not record the "plonk"

Check	Resolution
The cog has wound off.	Replace - Request a spare cog from Jenquip Resolution
Potentiometer damaged. The Potentiometer is the shaft part that drives the cog NB: Under no circumstances should you apply CRC or a light oil to the potentiometer. It is a dry bearing and any lubricant will render the potentiometer useless).	Send to Jenquip for service and repair.
Check the metal shaft is coming right back into the base of the black tube. Ensure there is no grass or soil build-up preventing it from doing so. Also check the washer at the bottom of the shaft is not catching on the bottom of the plate.	Clean the Plate Meter.
Check the cog is running smoothly on the shaft. If the counter is mounted too close to the metal shaft there will be quite a lot of friction when taking a reading. If the counter is mounted too far away from the metal shaft; the cog is liable to jump a notch easily.	Re-assemble the Plate Meter.

This is a precision meter - look after it.

Replacing the Battery

On start up if you get a “Lo” battery warning then the battery will need replacing over the next Farm Walk or two. A Triangle icon in the top left hand corner also indicates a low battery. The electronic counter is powered by a single 9V battery. The use of an Alkaline battery is recommended though a standard heavy duty battery will still work well. An Alkaline battery should give 40-50 hours continuous use. A NiCad rechargeable battery may also be used.

Before you replace the battery ensure the counter is switched off. Loosen the screw on the front lower panel of the counter—4 or 5 turns will be sufficient. The black battery retainer at the lower end of the counter can now be removed.

A screwdriver slot is provided if it needs a little levering out.

Remove the battery and gently remove the battery snap connections (lever off with a screwdriver). Fitting the new battery is a reverse of removal procedure.

If your battery is near the end of it’s life it is a good idea to carry a spare with you (nothing worse than getting 1/2 way around the farm and having a battery go flat on you!)

Fault Finding

There is no visual display

Check	Resolution
The Counter is not turned on	Turn on
The battery is flat	Replace battery
If you have just changed a battery you may have damaged the battery snap (clip to top of the battery)	Service – send to Jenquip

The counter continuously beeps and eventually turns off

Check	Resolution
This is normally due to a low battery. The counter requires a given level of power to operate correctly. If the battery doesn't have sufficient power it may continuously beep to warn you. Remember if you turn the counter off for a few minutes it may recover slightly but the problem will not go away.	Recharge the battery. Battery may be due for replacement. Requires electronic service.

have heard of disagreements with grazing contracts based around meter readings where each party thinks a different formula should be used. The answer is unbiased—for the most accurate formula, cut, dry and weigh a sample (See “Cutting Quadrats” in the Addendum). This weight is then compared with a meter reading for the same sample, using the various formulas, to see which one most closely matches the weight of the sample.

Remember—be **Consistent** with your farm walk and formulas and you will end up with records which are meaningful, comparable and very useable.

Using Your Plate Meter

PRINCIPAL OF USE

Place the meter squarely on the ground. The plate will "rise" as it rests on the grass, giving a reading of grass height (½ cm increments) on the bottom counter. At each measurement, click the top (sample) counter to record the total number of samples taken.

TECHNIQUE

Practice the technique of an interrupted slow walking pace, taking care not to "roll" the meter. This is where the plate is not square to the ground and it will provide a false HIGH reading. Go ahead: try "rolling" and compare the results with placing the meter squarely on the ground. See what we mean? The meter should also be lowered consistently—not gentle but not forced into the ground either.

FARM WALK

The more regularly you take readings the better. Astute farmers will take readers weekly, sometimes more often during critical times of the year and less frequently during times of static conditions.

The more samples taken per paddock the less margin of error. We recommend 20 to 40 samples per paddock but if you have bad conditions ie. pugged paddocks, then more samples should be taken.

Most paddocks will have areas of good growth and areas of poor growth. If recently grazed, the pasture may be clumpy. Ensure that your walk includes representative samples of both areas. Avoid tracks, stock camp sites and other uncharacteristic areas.

Take samples every 3 or so paces rather than choosing by eye the spot to sample. This removes operator preference for long or short patches.

Be Consistent. Plan the same walk every time although it can be done in reverse. This allows each walk to be compared with another.

Taking Paddock Readings (The Farm Walk)

Switch the unit on using the toggle switch at the back.

4. Reset by holding the 'Reset' button until the display changes to '0'. This should be accompanied by 2 short beeps.
5. Walk across the paddock taking readings every few paces. You will hear a beep every time a reading is stored. The average kgDM/ha is immediately recalculated and displayed. The number of samples (plonks) to be taken should range between 20 and 40 per paddock however this will be determined by the variance existing in the cover. You will hear 3 short beeps when you have completed 29 plonks and one long beep when you reach 30. This is the recommended number of readings. Plonks need to be taken on a regular basis e.g. every three paces to even out any variations, however avoid stock camp areas, tracks or uncharacteristic areas. The greater the variability the greater the number of plonks you should take.
6. If you need to negotiate an obstacle (e.g. fence or creek) switch the unit off so that no readings are taken if the plate moves. On the other side of the obstacle, switch the unit back on and continue taking readings.
7. When you have completed the paddock, read off the average pasture cover.
8. Write down the average height and/or the average cover in the All Weather Note Book.
9. Repeat instructions 4 to 8 until you have completed every paddock.
10. Switch the unit off using the toggle switch at the back.

Undo Feature:- You can "undo" the last Plonk or reading by holding down the "Height" button as you switch on the counter. The count will now be one less than what it was and the dry matter reading will also change to the previous reading. You can continue taking more readings if you wish.

Results from your feed budgeting will assist you in making important management decisions such as :-

- Stocking rates
- Quantity of feed supplements to feed
- When to apply nitrogen fertiliser
- Predicting future shortages or surpluses of pasture
- Planning silage and hay making
- Drying off times
- Stock sale decisions
- Highlighting poor performing pastures or paddocks

Software

Use the Jenquip **Pasture Management Software 4** to further process the plate meter readings and do your feed budget.

Total Dry Matter = Kg Dry Matter per Hectare x Paddock Area

Growth Rate of Pasture

$$= \frac{\text{Final Kg DM / Ha} - \text{Initial Kg DM / Ha}}{\text{Number of days Between Samples}} \text{ (Kg DM / Ha / day)}$$

Maintenance

Your meter has been developed over a number of years to be simple, effective yet reliable. However a little maintenance will ensure many years of trouble free use from this meter.

Before Use

After unfolding the meter and assembling the plate onto it ; move the plate up and down a few times to ensure no binding occurs. If its movement is restricted the reason must be found and cured before the meter is used.

After Use

Remove the plate and wash it clean.

Wash / wipe and dry the area around the bottom of the meter. Move the sliding tube assembly so that all dirt and accumulated grass can be washed away.

Apply some dry lubricant or light oil to the hinge assembly and to the inside of the hinge lock tube. Store the meter in its folded position.