

Farming Forecaster

TFS Seasonal Update | 26 Oct 2020

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Some common questions/comments from producers...

- The moisture probe readings seem to be out
- The rain gauge isn't correct – what impact does this have?
- The pasture growth rate does not reflect today's weather
- The pasture forecast is too low



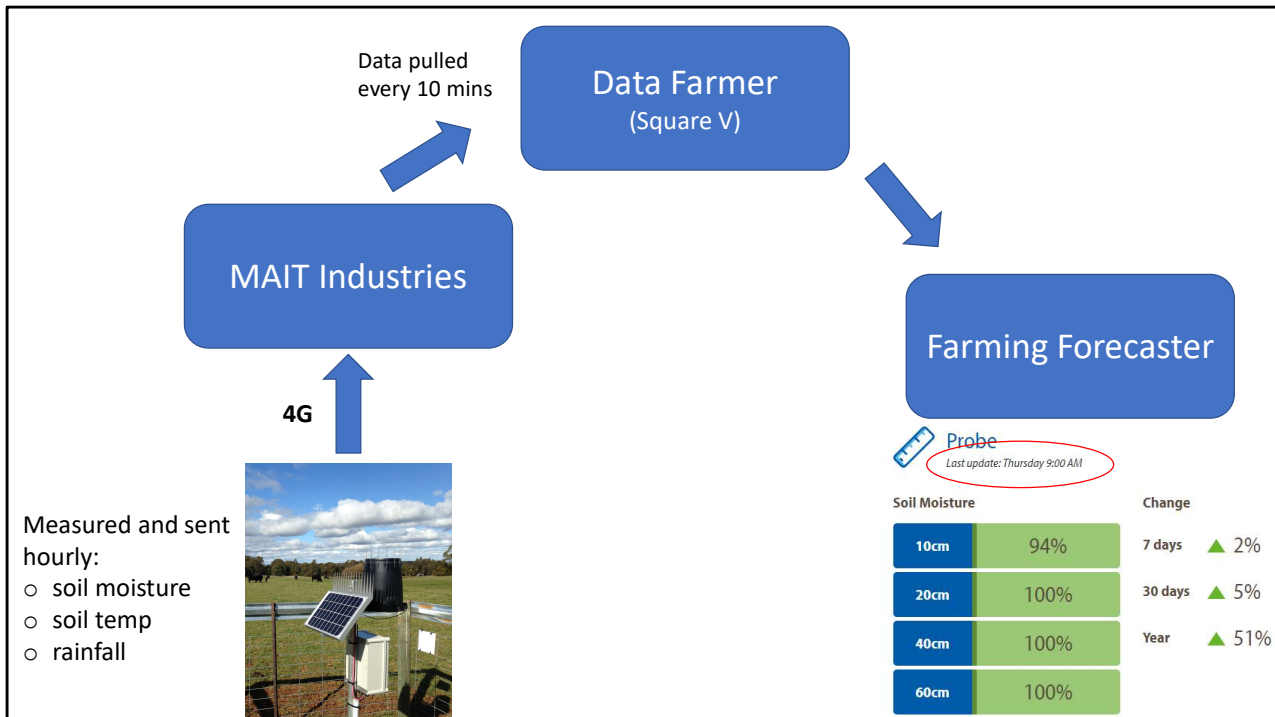
Some common questions/comments from producers...

- The moisture probe readings seem to be out



This could be due to two things:

- 1) Is the probe data up to date?
- 2) Calibration of the soil moisture readings



Is the data up to date?

When you view the soil moisture information on Farming Forecaster you are seeing the end product.

However, there are a number of cogs that are turning behind the scenes.

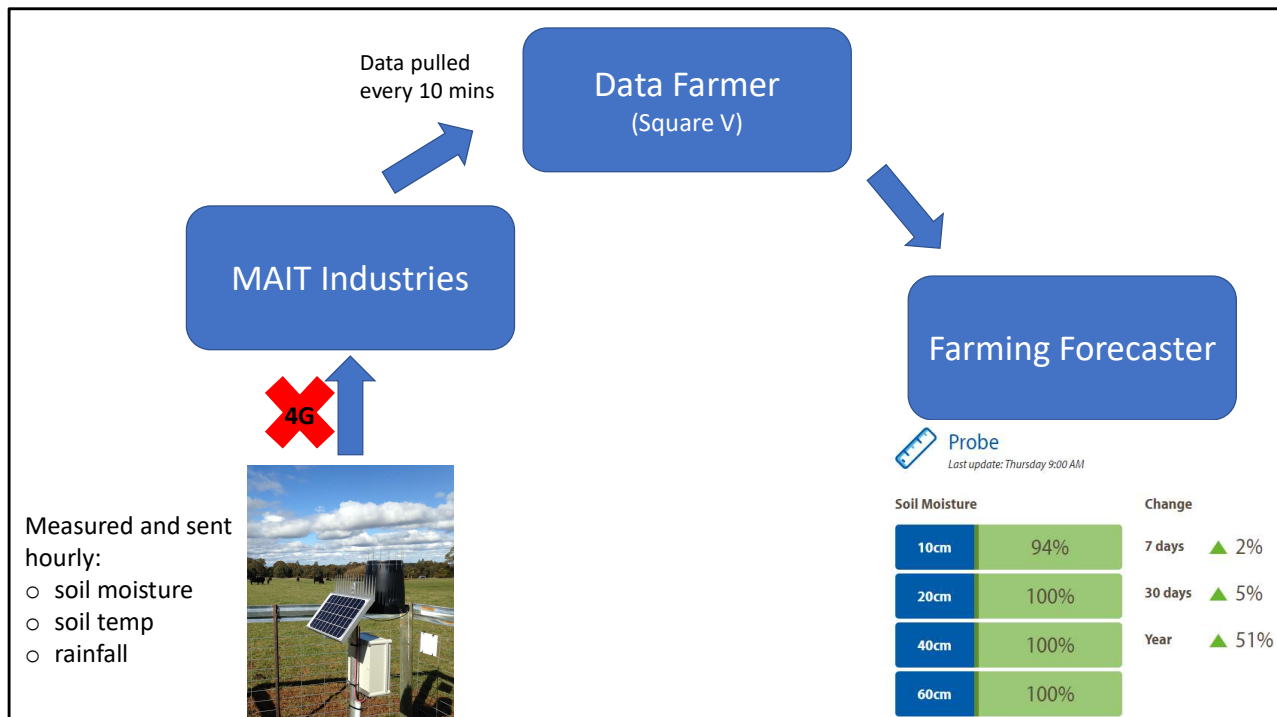
The process starts in the paddock. At all probe sites 3 pieces of data are being recorded and logged every hour of the day – soil moisture, soil temp and rainfall.

Data is sent from the paddock to MAIT industries in Victoria via the 4G network. This is also done every hour.

Data Farmer (software program developed by Square V) pulls the data from MAIT every 10 minutes and immediately feeds this data into the Farming Forecaster website.

The time stamp on the FF website (under the 'Probe Heading') shows when the probe data was last updated to MAIT.

While there are a number of steps, it all happens quite quickly and seamlessly – so we are getting 'real time' data.



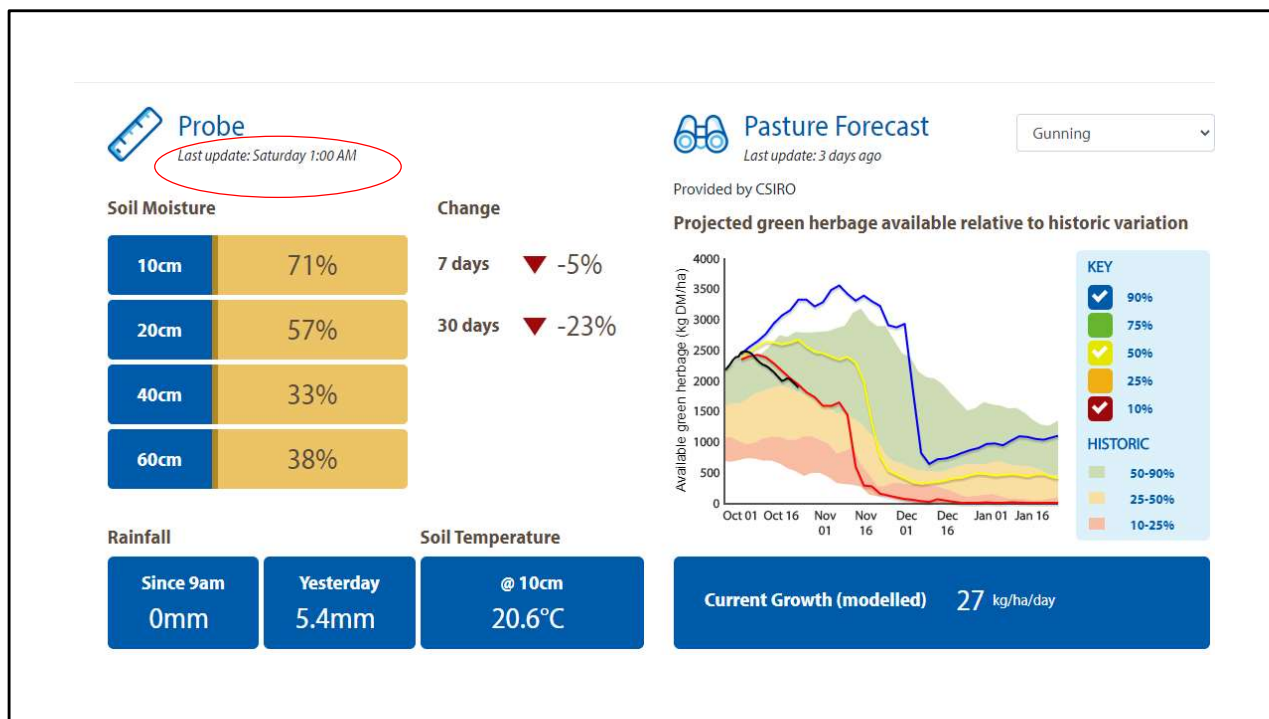
However, the whole process relies on the 4G network and if the connection is lost for some reason, the data feed stops. This could be due to bad weather, mobile tower works/ updates being done etc.

The battery that powers the modem can also fail when they get a bit of age, which then causes connection issues. E.g. a connection will only be established during the day when the solar panel is providing enough power.

Rough, windy weather can also cause some internal wiring connections to come loose. This was a case with the Gunning probe recently – we thought it was a dead battery, but it turned out to be a loose connection.

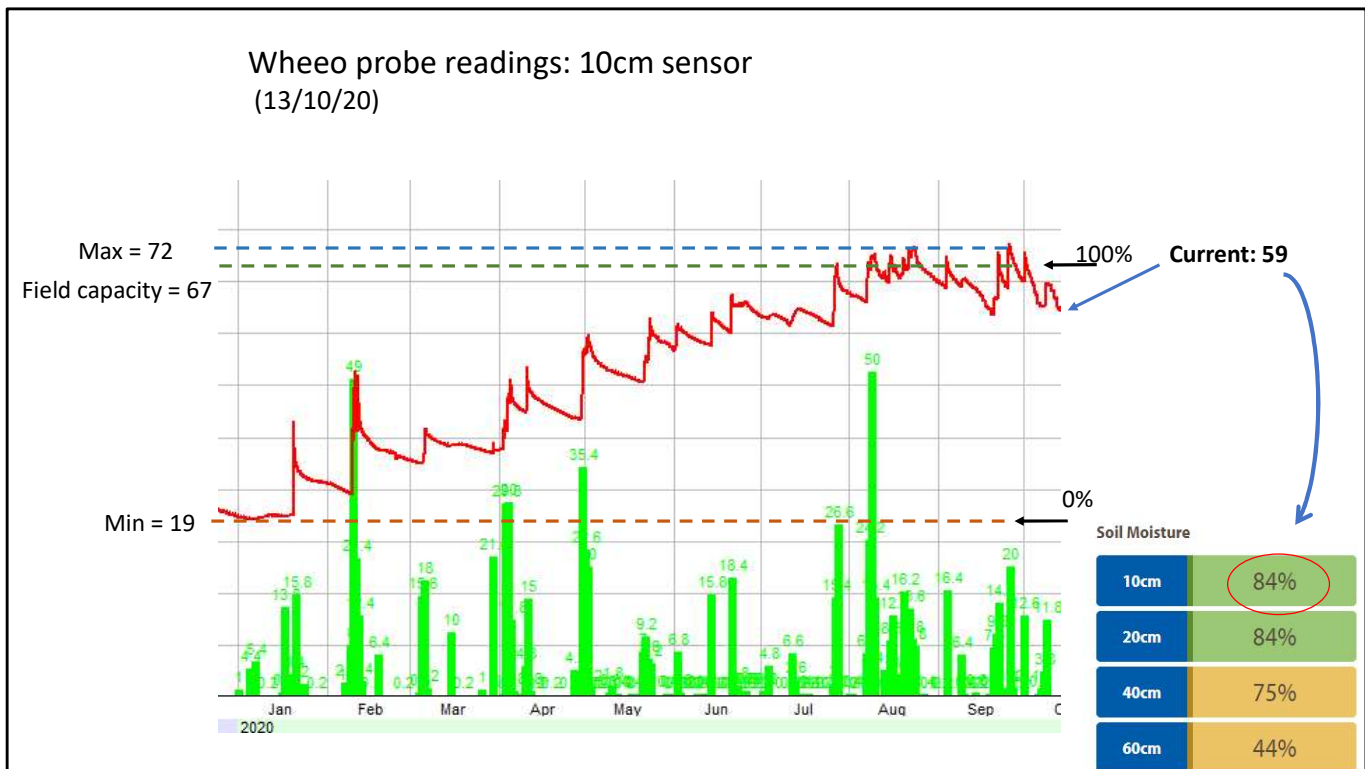
So if you notice that data for a particular location isn't up-to-date, it's likely to be a connection issue in the field. Connection issues will cause a delay in the data coming through, so sometimes you just need to try again in a few hours time. If the problem persists for a day or so, let Pip or Tracy know so it can be investigated.

The good news is that we don't lose data when there is a connection issue – the backlog of data will be uploaded once the connection is re-established.



As it turned out, the Gunning site hadn't been updated for about 30 hours.

Take home message: Probe data is real time and should be up-to-date – look at the time and data stamp. Sometimes there are connection issues from the field. If this happens, just wait and check it a bit later in the day. If problems persists, let Pip or Tracy know.



Calibration

Calibration is the other main reason why the moisture probe readings might seem to be out – although this problem shouldn't be an issue from now on.

When the probes are installed they start taking measurements straight away. This measurement is just a number and is a measure of the electrical resistance between two copper plates.

Here we are looking at a screen shot of the 10cm sensor readings at Wheeo spanning from late December last year through until early October.

The lower limit is very easy to ID and typically occurs during summer. The lowest reading the sensor has recorded is 19 and occurred in early Jan.

The number we select for the upper reading (referred to as 'field capacity') is not quite as straightforward. There's no point setting the upper limit at the highest reading as this is when the soil is saturated and you get a temporary spike in the probe readings.

We set the upper reading by carefully looking at the data to see where free drainage has occurred – this point is termed field capacity is the amount of water content held in soil after excess water has been drained away by gravity forces. Think of a large sponge dunked in a bucket of water - when you pull it out the sponge is saturated and water freely drains out, but after a little while the drainage stops. In soil terms this point is called field capacity.

For this example the max reading was 72, but we've set field capacity at 67.

Establishing the minimum reading and the field capacity reading is done for the 4 sensor depths at all sites.

In this example, you can see the current reading is 59, which is 40 units above the dry point and 8 units below the field capacity. On a percentage basis this works out to be 84%.

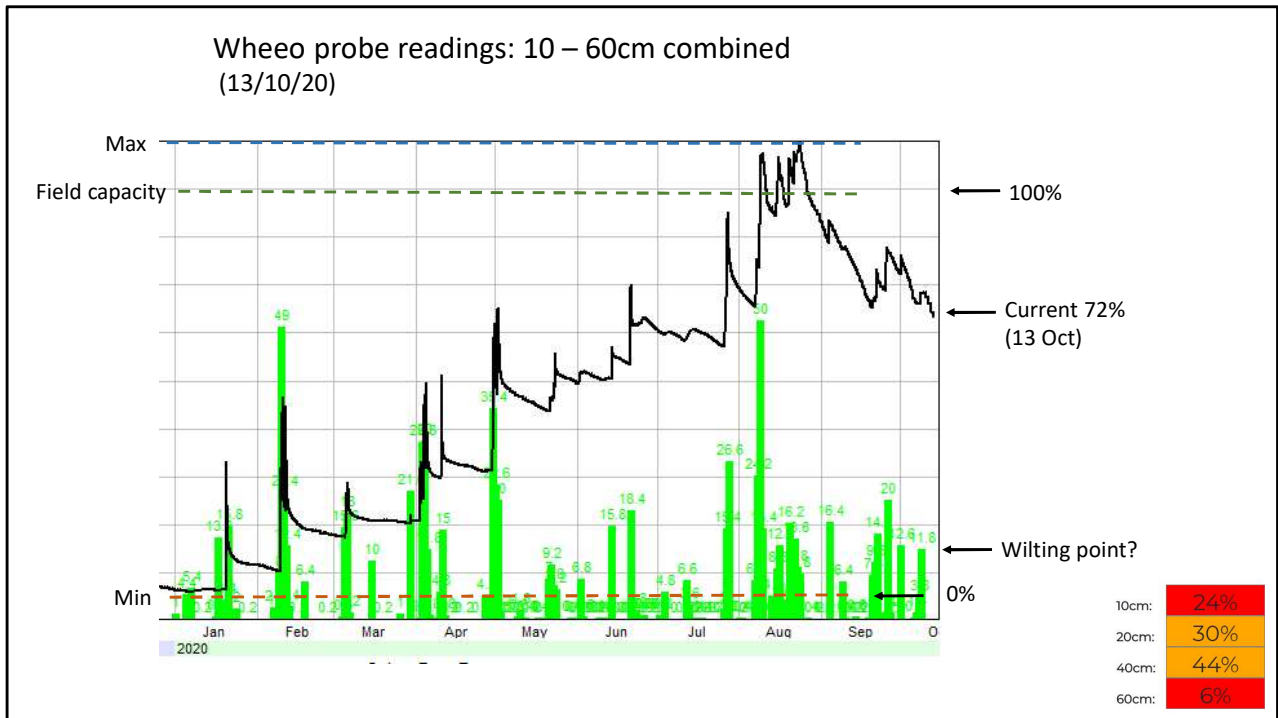
Updates to the Calibration settings

At the start of October I spent some time checking and fine-tuning the probe calibration settings. In making these adjustments, at some sites the moisture percentage readings on Farming Forecaster changed quite a bit.

The reason I did this was because August 2020 was the first time the sites have fully wetted up and recharged to depth. This is important because the moisture readings are a relative measurement (expressed as a percentage) and we need to establish both the bottom (dry) and upper readings (wet/ Field Capacity) for each sensor depth.

Given the recent drought conditions and the good 2020 season to date, I'm confident that the calibration settings will be right from this point on and the moisture percentage readings we are now getting on FF are an accurate reflection of soil moisture levels in the field.

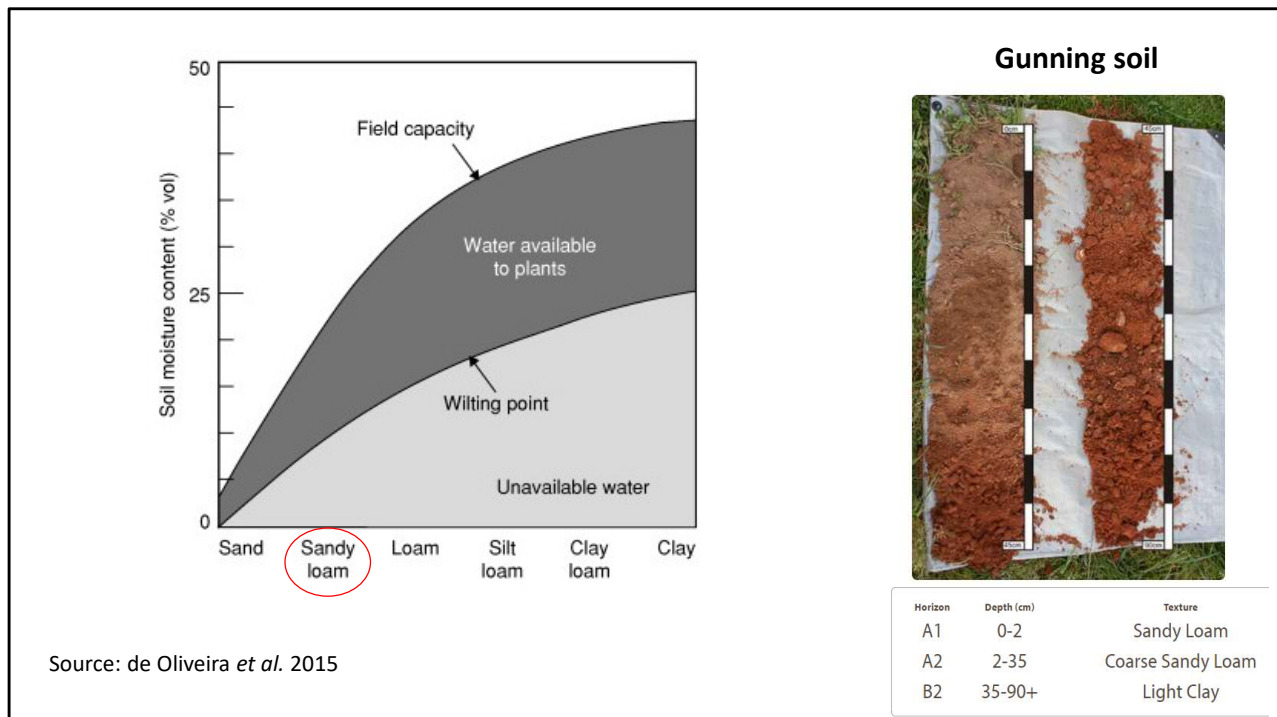
The only exception would be the newly established probe at Hovells Creek. This site has been a bit drier and doesn't appear to have quite reached Field Capacity at 40 and 60cm yet.



This graph shows the combined probe readings for the 10, 20, 40 and 60cm sensors at Wheeo. So this is now a picture of overall soil moisture in the top 60cm.

The dotted lines are indicating the min, max and field capacity points.

Key thing to note here is that plants will stop growing well before the moisture % numbers on farming forecaster reach zero. Remember, if the % number is zero, it means that the soil is extremely dry and is equal to the driest reading that's been recorded – which typically occurs during summer.



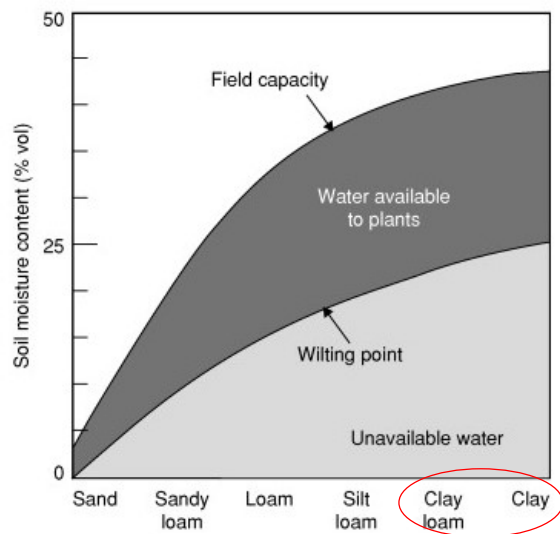
The diagram on the left quite neatly shows the effect of soil texture on wilting point and field capacity.

Field capacity is when the soil is fully wetted up and free drainage has occurred.

Wilting point is the when the soil is dry and the plant can not extract any more water. Using the sponge example, it doesn't matter how hard you squeeze a sponge you will never fully dry it out.

The difference between field capacity and wilting point (dark shaded area) is the amount of water available to the plant for growth. In other words, the dark shaded area is an indication of the size of the 'sponge'. In general, the greater the clay content of the soil, the bigger the sponge.

As an example, if we look at the Gunning site we can see that the soil is a sandy loam. This soil would have quite good infiltration rates and quickly respond to small rain events, but it's not an overly big sponge. It would tend to fill up and dry out quite quickly, so regular top up rain events are important.



Source: de Oliveira *et al.* 2015

Bannister soil



Horizon	Depth (cm)	Texture
A1	0-12	Clay Loam
B1	12-25	Clay Loam
B21	25-55	Light Clay
B22	55-90+	Medium Clay

This is the soil from the Banister site.

We are now dealing with a much heavier basalt soil with a high clay content. So a much bigger sponge which can store and carry a large amount of water.

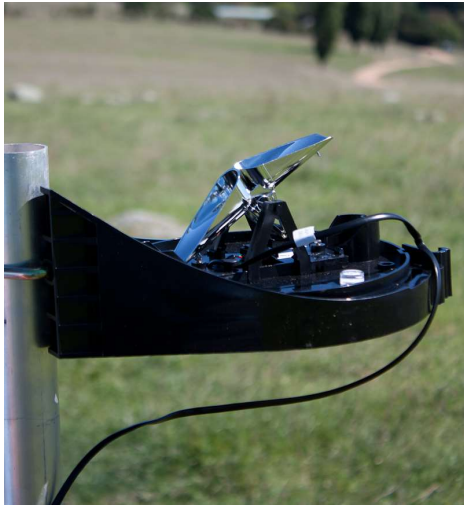
However, high clay soils also have a high wilting point which can work against you when conditions are dry. Once they dry out, you need a bigger rain event for the plants to 'see' the moisture and respond.

Some common
questions/comments from
producers...

- The rain gauge isn't correct – what impact does this have on the pasture outlook?



1) The automatic rain gauges are not 100% accurate, but still provide valuable information



3 KEY POINTS REGARDING THE AUTO RAIN GAUGES...

POINT 1: The automatic rain gauges are not 100% accurate, but still provide an indication of the amount of rain that has fallen at the probe site.

Rainfall data is obviously useful when interpreting the soil moisture readings.

The rain buckets tend to be very accurate when rain is 'normal', but can be up to 15% out when the rain is very heavy or very light. Paul Hudson has tried a range of automatic rain gauges at various price points and his comment is that you can spend a lot more money for no real gain in performance.

Some maintenance is required – biggest issue over the last couple of years has been blockages from dust.

The newer probes that have been installed in the last couple of years have an improved rain bucket design which means they are less prone to blockages from dust and bird droppings.

However, it is still important to keep an eye on rainfall measurements and investigate if there appears to be an issue.

Also worth spraying some residual insect spray inside the bucket to control spiders and bugs.



2) The rain gauge and moisture probes are independent

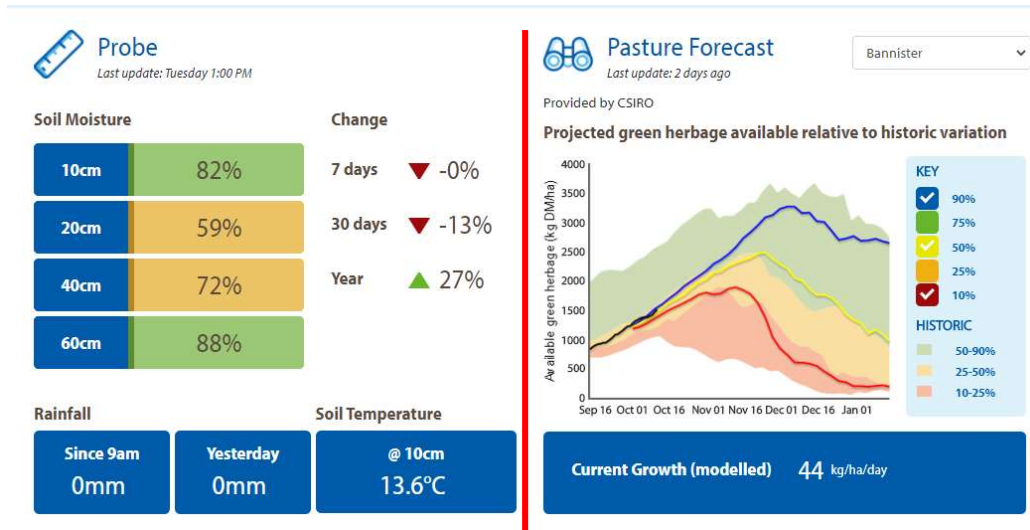
POINT 2: The rain gauge and moisture probe are independent.

The moisture probe will continue to take measurements every hour, regardless if the rain gauge is working or not.

If the rain gauge isn't working correctly, the only impact this has is that the rainfall data on the website will be wrong - which makes it a bit difficult for users to interpret the moisture readings. It looks a bit strange when soil moisture goes up and there hasn't been any rain!

MAIT can manually correct the rainfall data if there is an issue with the rain bucket.

3) The rain gauge and pasture outlook are also independent



POINT 3: The rain gauge and pasture outlook are also independent

The pasture forecast, which is generated by GrassGro uses BOM historical climate data, not measurements taken on site. This is done for a couple of reasons:

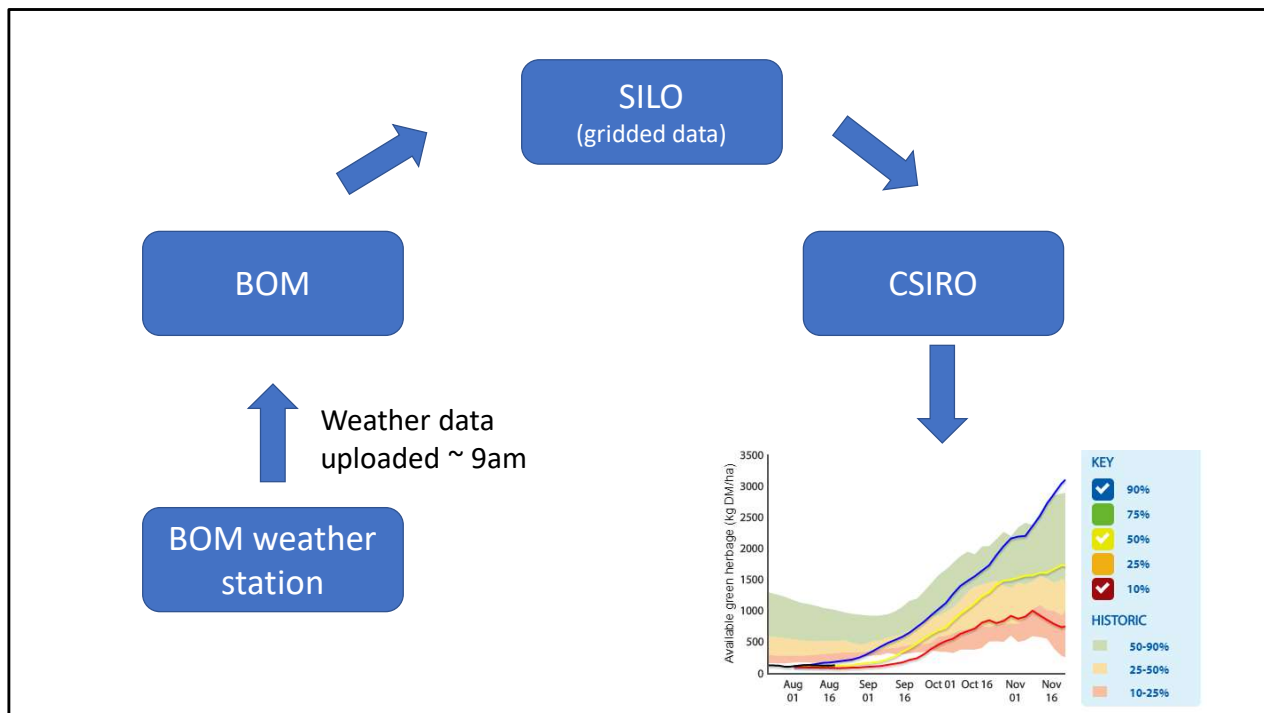
- 1) In terms of climate data, we are only recording rainfall at the site. For GrassGro to run it needs a whole range of daily climate data including max and min temperature, evaporation, radiation, relative humidity etc.
- 2) To produce a tactical run in GrassGro (pasture forecast) we also need long-term weather data – with farming forecaster we are using the last 30 years.

So the measurements coming from the paddock (soil moisture, soil temp and rainfall) are not linked to the pasture forecast. In other words, a faulty rain gauge will not have any impact at all on the pasture forecast for that site.

Some common
questions/comments from
producers...

- The pasture growth rate does not reflect today's weather



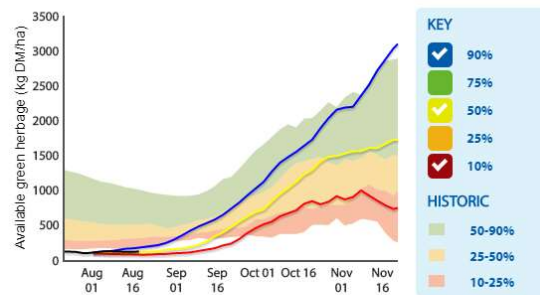


Why might the pasture growth rate be lining up with your expectation?

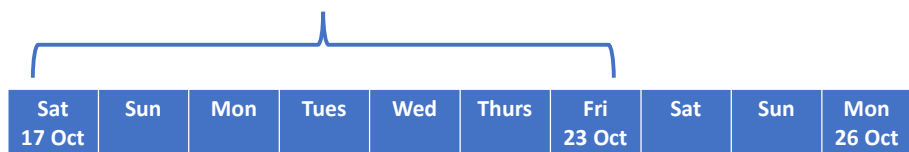
For the GrassGro model to run it needs gridded data which is constructed by SILO. CSIRO then uses SILO gridded data to run the GrassGro model for each location.

So there are a number of steps in this process – it takes around 2 days for CSIRO to get a complete dataset and run the model. This 2 day time lag is one reason why the pasture growth rate might not be aligning with your expectation.

Projected green herbage available relative to historic variation



Current Growth (modelled) 6 kg/ha/day



In addition to the 2 day lag phase, the other thing to note is that the pasture growth rate figure on Farming Forecaster is an average figure over 7 consecutive days. This number used to be a 3 day rolling average, but it was recently changed to a 7 day average to make it a bit more stable. We found that 3 days was a bit short and it was a bit too sensitive.

So, if you go on the website today (26 Oct) and look at a growth rate figure, it's actually an average growth rate of the 7 day period from 17 Oct through to 23 Oct.

Some common
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producers...

- The pasture forecast is too low



The pasture forecast too low

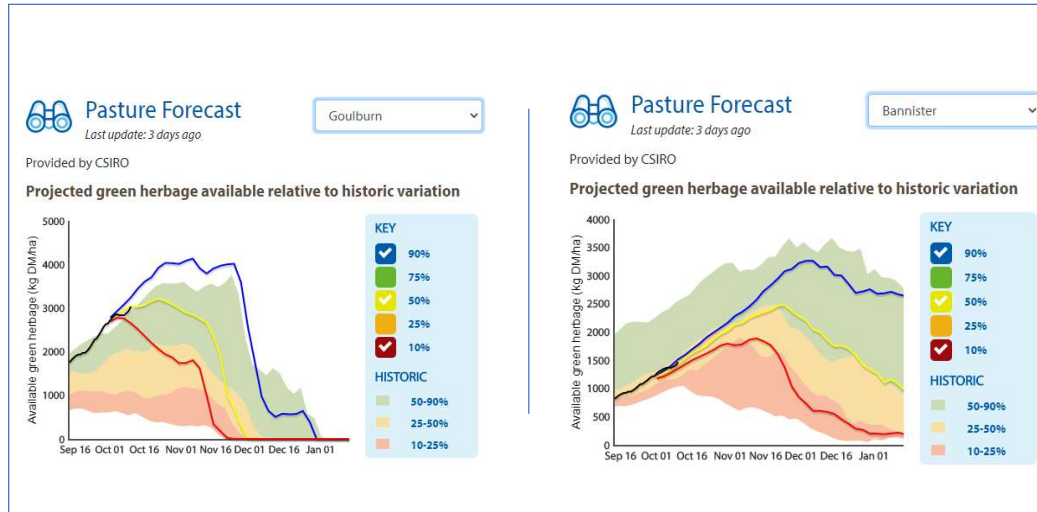
Some possible reasons...

- The pasture forecast is for the 5km x 5km grid, not the property where the probe is located
- There is no destocking policy in GrassGro – the farm systems were fully stocked during the drought and in 2020
- The model farms are 100% pasture based (i.e. no grazing crops for stock to go onto).

There is no destocking policy in GrassGro, so the GrassGro farm systems ran at their normal stocking rates during the drought and stock were being fed in the paddocks. GrassGro farm systems were also fully stocked at their normal capacity this year coming out of the drought.

Because of the strength of the autumn break this year, properties got away quickly, especially where stock had been taken off country (either in droughtlots or removed off-farm). So the GrassGro farms have been playing catch up all year.

Did you have dual purpose crops and rest pasture paddocks during the year? This would also explain a difference between what you are seeing locally and the pasture levels on Farming Forecaster.



However, there are some farm systems that are still a bit low from a pasture perspective.

Goulburn model – showing starting position at the beginning of October is above the 90th percentile, which is where you'd expect it to be considering the season we've had. In contrast, Bannister is well below what you'd expect to see.

Phil and I will be doing a review of pasture forecasts in the coming weeks and we'll look into the locations that appear to be out.

This is all part of the fine tuning process. Feedback from probe hosts is important – it you think the data looks a bit strange or isn't reflecting reality, it's important that you flag it so we can look into it.

Pasture Forecasts

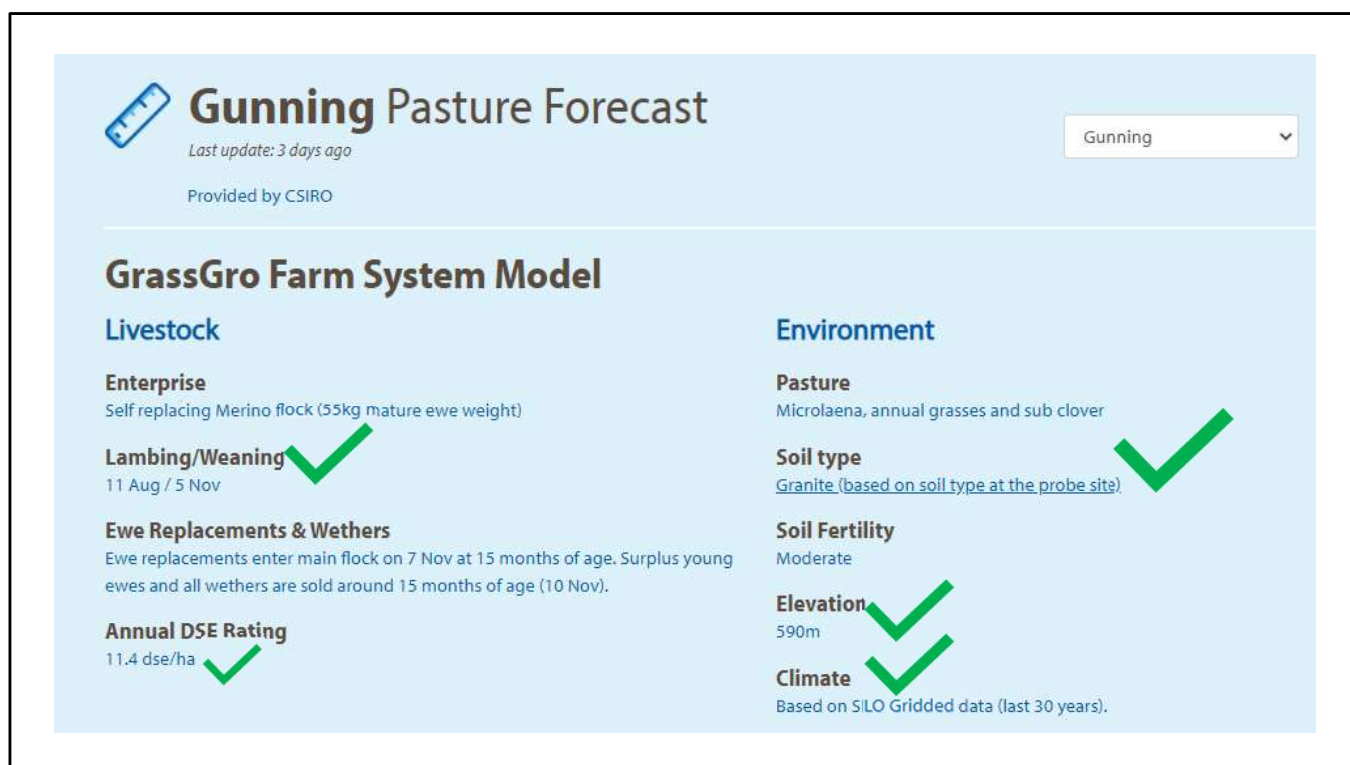


How do you apply the pasture forecast information to your property?

When you are looking at the pasture forecasts, try to avoid getting bogged down in the detail.

Look for trends rather than absolute numbers that you can then bring back to your own place to make sense of which direction things might go.

Also, don't just look at one site and leave it there. By looking at a number of sites you will start to see trends and pick up information on what's happening around you.



If you are trying to work out which sites might be relevant to you, what are the key factors to look at?

The very top of the 'Pasture Forecast' now contains information around the assumptions have been used when building the GrassGro model for each site. When we first launched the website this info wasn't available. It is now.

It is really important that you have a look at this info and understand exactly what is being modelled.

Info sits under 2 headings – 'Livestock' and 'Environment'.

The green ticks on this slide are where I would place most of my emphasis when selecting reference sites.

Soil type

- Regardless of whether you are looking at moisture probe info or the pasture forecast, soil type is by far one of the most important factors to consider when selecting a reference site.
- There is some really good, detailed soil info on the website with photos. Have a good look at the soil type and think about how compares to your soils at home. If the site closest to you is radically different in terms of soil type, it's important to make a note of that and look further afield to see if there are other sites that are more closely matched with your soil.

Elevation and climate

- Both are important factors. Ideally you are looking at sites of similar elevation and rainfall. If there is a considerable difference, you need to note that and take it into account.
- The GrassGro farm system is based on Gridded data. Use the rainfall graph to check how your rainfall compares to the 30 year average Gridded data for that site. Are you wetter or drier than the gridded data?

Pasture type

- All GrassGro farm systems have a perennial grass base and have been built using a mixture of relevant species to the local area. Some are native based, some are introduced (e.g. Phalaris, perennial ryegrass etc). Microlaena has been added to most farm systems so that the model can respond to out of season rain (to some degree).
- Don't get too concerned if the species list doesn't exactly match what you've got on your property, the important thing to note is seasonal pattern of growth (e.g. winter dominant pasture with microlaena for some out of season growth).
- Note - GrassGro farm systems do not include tropical (C4) species (e.g. red grass, kangaroo grass, paspalum, summer active weeds etc). At times these summer active species can provide very quick and big volumes of feed in response to summer rain, but this will not be picked up by the black pasture tracking worm or the pasture outlook.

Soil fertility

When building farm systems there is a fertility scaler that determines the degree to which pasture growth will be restricted by soil fertility.

- Good = no major soil nutrient deficiencies (e.g. P and S are near optimum and no other major issues restricting plant growth).
- Moderate = soil fertility is being addressed through semi-regular fertiliser application (e.g. once every 3 years).
- Low = low soil fertility

Soil fertility is matched with stocking rate – aim is to select a long-term stocking rate where at least 70% ground-cover is achieved in 70% of years.

Now on the Livestock side....

Enterprise

- Most farm systems are running sheep enterprises. There are only 2 beef enterprises on the tablelands – Braidwood and Sutton Forest. The enterprise being used isn't a major factor, so don't discount a site if you are running cattle and the

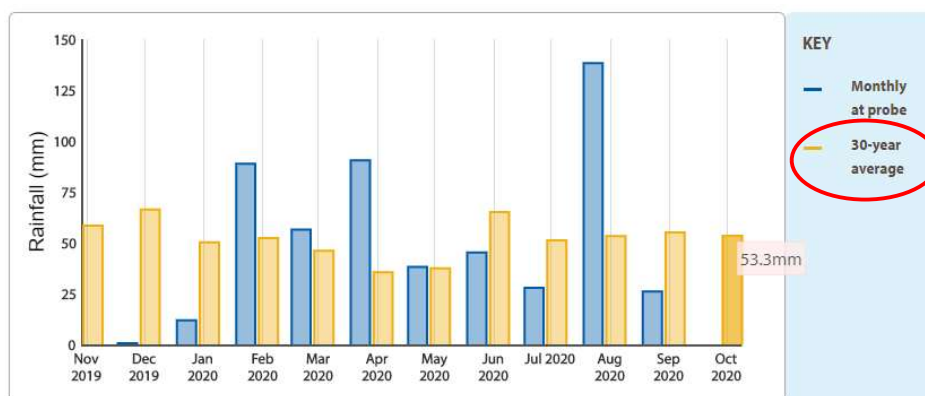
grassgro farm system is based on sheep. If we were to take out sheep in this case (Gunning) and replace it with a beef enterprise at the same stocking rate, the net result would be very similar.

- The main thing to note is the **timing of lambing or calving** and how this lines up with your property. For example, if you are lambing or calving in June and the model is based on a late August lambing, then you need to be aware of that difference when looking at the information.

Stocking rate (SR)

- SR is listed on the website and is expressed in DSE/ha. This is an average annual DSE figure and takes all livestock categories into account (i.e. breeding females, maidens, weaners etc). This number is important to factor in when looking at the data.
- GrassGro will give a higher SR than calculated by using DSE 'tables', because the model takes account of weight gains especially in finishing stock which generic tables under estimate. We are talking of the order of 1 to 1.5 dse/ha, especially with Prime Lamb enterprises.
- If your SR is much lower than what's being used in the farm system, then the amount of pasture available is likely to a lot more than what the pasture forecast is indicating. However, if your SR is lower, but your soil fertility is also lower than what's included in the model, then the overall result in terms of pasture availability, livestock performance etc is likely to be similar.

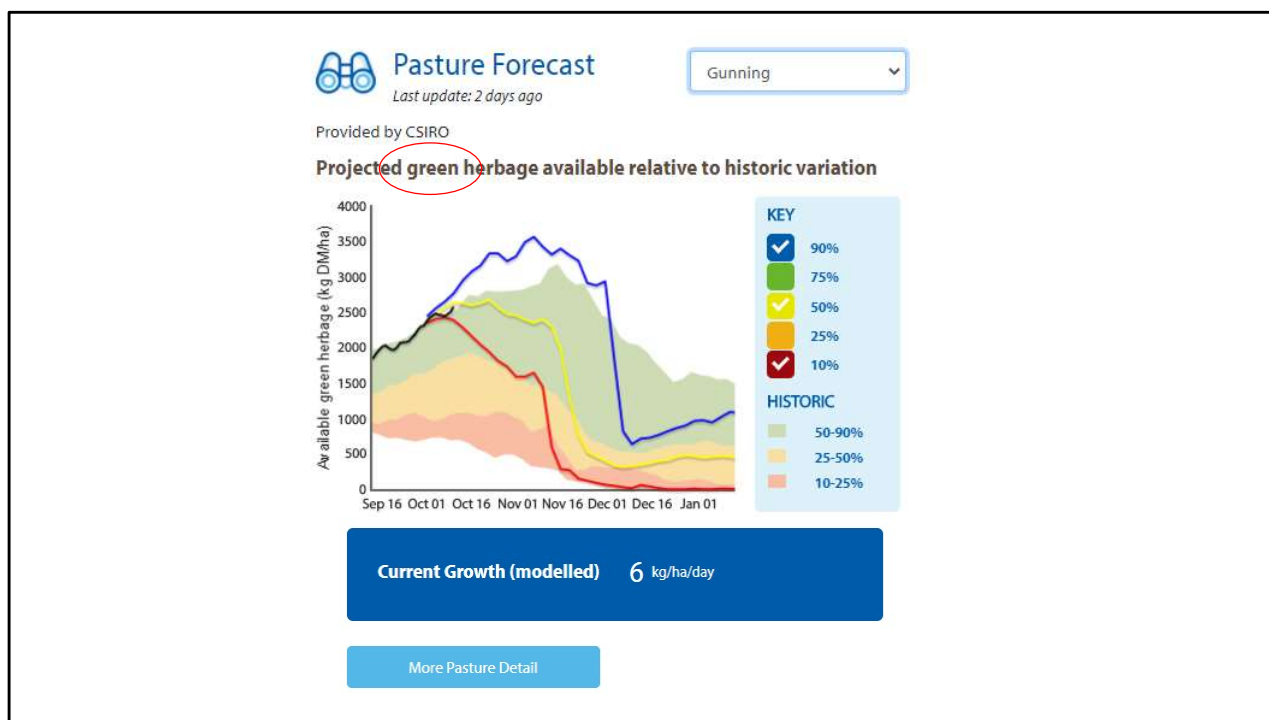
Comparing gridded data to your ave rainfall



As previously mentioned, the GrassGro farm system is based on Gridded data.

If you go into the probe section on the website there will be a chart showing monthly probe rainfall vs the 30 yr ave gridded data. If you hover your mouse over the yellow bar the number will appear.

If you add all the yellow bars up for the 12 month period you can check how your rainfall compares to the 30 year average gridded data for that site. Are you wetter or drier than the gridded data? With your rainfall data, make sure you are comparing the same 30 year period (1990-2019).



Here we are looking at the pasture forecast for Gunning which was updated at the start of October.

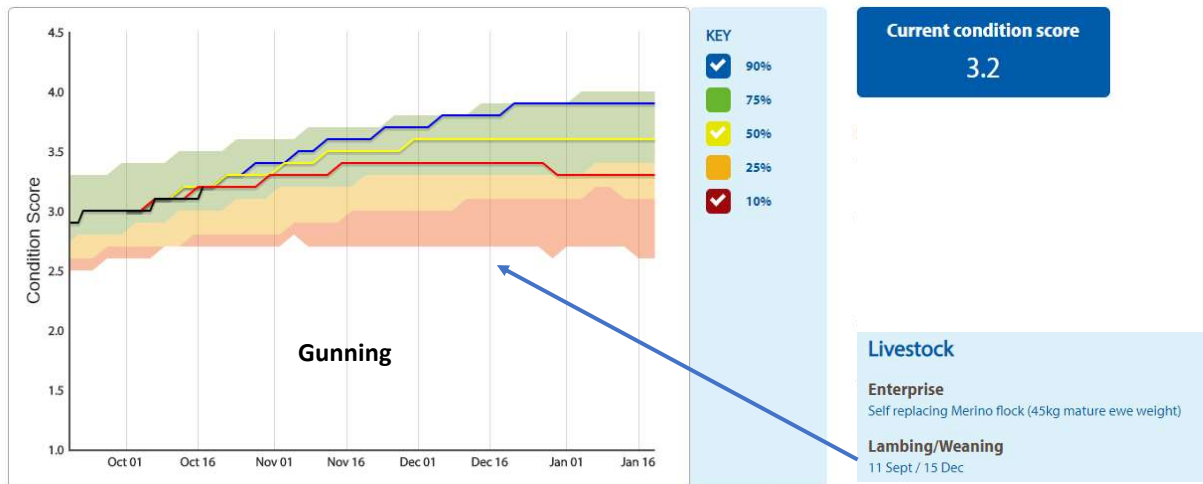
Shows pasture availability is very high. This site has a light soil and isn't able to store a lot of moisture, so regular rainfall is important. Hence why the coloured lines separate very quickly.

Model indicating the green component disappearing at some stage in November, this doesn't mean the property is running out of feed, but rather the pasture is shifting from green to dead. Remember, this pasture supply graph also doesn't factor in any summer growth we might get from the C4 species like redgrass, kangaroo grass, paspalum, etc.

Is there much point looking at the pasture forecast at this stage of the year? Probably not. We know we have a spring, and at present pasture quantity definitely isn't an issue. The bigger issue over the coming months will be managing pasture quality.

In addition to the pasture forecast, FF provides a range of outputs and information around Plant Available soil water, ground cover and animal performance indicators, such as ewe body condition, weaner growth rates and supp feeding requirements. Click on the 'More Pasture Detail' button to view the extra info. Refer to the online training videos for detailed info on how to view and interpret these outputs.

New info: Female Condition Score



This is one of the newer graphs that has just been added.

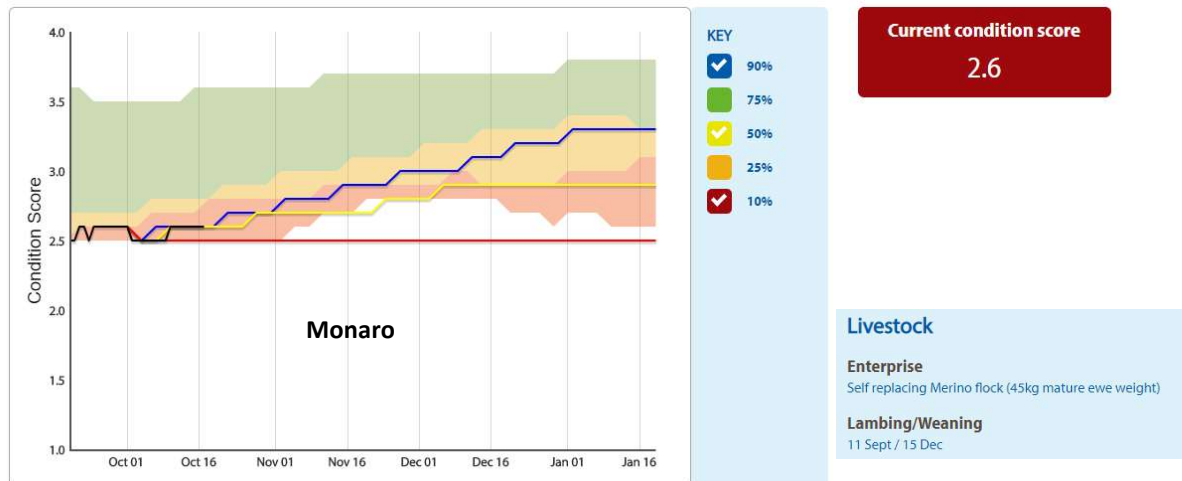
You read the graph the same way as the pasture forecast.

For this site, it shows female starts above the long-term average (green zone) and all 3 projected lines are trending upwards, indicating weight gain of ewes throughout the forecast period, even under a very dry scenario (red line).

Remember, these graphs are just dealing with the forecast period – at present 1 Oct to mid January (3.5 months).

Important to look at the top of the page and check the assumptions. For the Gunning site lambing is 11 Sept.

New info: Female Condition Score

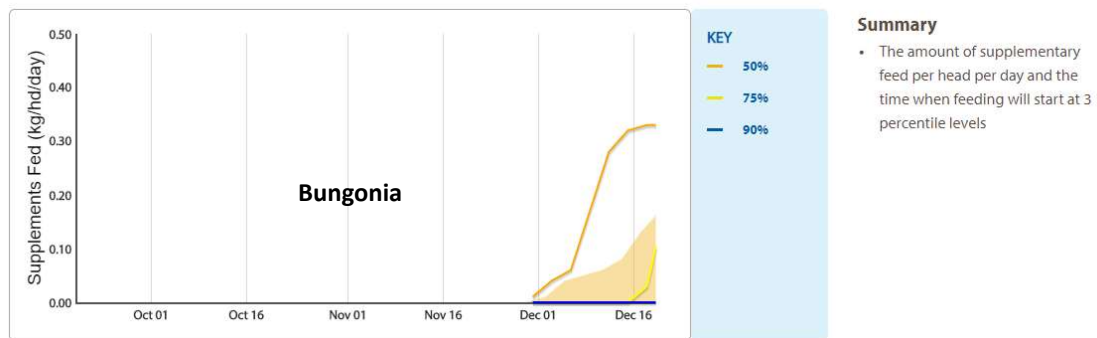


This is now the same graph, but for one of the Monaro sites.

Very different scenario – ewes were around CS 2.5 at the start of the forecast. Starting position is well below the long-term average – starting in the red territory, so well below the long term average for this time of the year.

Graph shows a much greater spread of possible outcomes. Unlike Gunning, ewe CS at this site is much more sensitive to rainfall between now and the end of the year.

New info: Feeding Projections for Weaners



This graph was recently released onto the website, but there's an issue with it. This is currently being looked into.

New info: Chill Index

**Member Updates**
Last update: 17/08/2020 1:37 PM


Introduction to Farming Forecaster
This video provides a basic overview of Farming Forecaster, including how to access the tool and general layout of information.
[Read More](#)
[More Notices](#)

**Weather Forecast**
Last update: 4 hours ago

Provided by CSIRO Some data on this app, is sourced from the Bureau of Meteorology

	Chance of Rain	Rainfall	Temperature	Warnings
Today	12%	0.3mm	4-22°C	
Tue	23%	0.4mm	9-24°C	
Wed	16%	0.4mm	8-22°C	
Thu	11%	0.2mm	13-25°C	
Fri	45%	4mm	10-22°C	
Sat	71%	5mm	10-20°C	 1116
Sun	80%	7mm	8-16°C	

[More Weather Forecast Detail](#)

The 7 day weather forecast now includes a Chill Index Alert. This alert is consistent with the Lambs Alive model (used in GrassGro) and is designed to predict the risk of death in new-born lambs from bad weather. The Chill Index is also applicable to sheep off-shears.

The Chill Index is a function of average daily wind speed, average daily temperature and total daily rainfall. The Chill warning (blue sheep icon) appears once the index exceeds the 1100 threshold and the index value is shown. There are no hard rules or guidelines around the index numbers, but over time you will get a sense of what Chill Index value is likely to cause issues on your property.