

Farming Forecaster

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Abstract: *New technologies collecting more data are of little use to producers unless they can access the analysed data in a form and time frame that suits their operation. Farming Forecaster does that by combining products that have been used for the last decade and automating the collection, processing and presentation of quality data via a web-based application. The automation has reduced the cost to provide information to producers. These efficiencies have enabled the network to be expanded, increasing the number of sites and value to producers.*

Key words: Seasonal forecast, producer relevant data, digital technology

Introduction

The Farming Forecaster website (<https://farmingforecaster.com.au/>) was released in April 2020. At present Farming Forecaster covers the south east region of NSW, with plans for it to be expanded to cover the northern and central tablelands and the eastern riverina during the next 12 months.

The website provides current and historical soil moisture, soil temperature and rainfall data from 29 sites. In addition to field data, the website also provides current and future weather details (based on five square kilometer grids), current and future pasture mass, predicted levels of ground cover and livestock data for the next four months on a risk basis. Weather and soil moisture data are updated daily and the pasture/livestock data every third day.

For breeding enterprises, changing the number of breeding females has long-term impacts (both negative and positive) on the business and hence needs to be carefully considered. Farming Forecaster provides the most comprehensive set of data to assist livestock producers in making decisions about future stocking strategies. Producers have commented that this data improves their confidence to take timely actions.

History

The first moisture probe network in grazing areas was established by CSIRO in 1998 under the name 'Across the Fenceline' in the Bookham and Harden regions of NSW. Producers accessed the data by a website.

In 2001 Australian Wool Innovation funded a project which resulted in Bookham Agricultural Bureau (BAB), CSIRO and NSW DPI working together to use the GrassGro™ (Moore *et al.* 1997) program to examine major questions that livestock producers were concerned about. The capacity of the program to produce seasonal outlooks for the next three to four months was positively received by the producers.

Over the next decade NSW DPI staff continued to use GrassGro™ to produce seasonal outlooks as part of their district work. Monaro Farming System (MFS) started in the early 2010s to do seasonal outlooks in autumn and early spring on annual basis. This was well received by members. Tablelands Farming System (TFS) began the same process a few years later. The development of a bigger moisture probe network in the south east started in 2016. This included developing a new website where the data display was further advancement on the earlier 'Across the Fenceline' website.

By the late 2010s, members from MFS and TFS wanted to be able to access the seasonal outlook information on a more regular basis, but the cost of producing the outlooks prevented this from occurring. In 2018 a consortium of MFS, TFS, BAB and Local Land Services (LLS) were successful in obtaining funding from the Australian Government's National Landcare Program which allowed the development of Farming Forecaster. CSIRO and Square V were contracted to develop the required computer systems and website.

Farming Forecaster has been developed with producers and has used the 20 years of experiences of producers and advisors with

moisture probes and GrassGro™ to refine the material that is now displayed.

Site layout

The front page can be divided into four segments,

- top left: Probe – the data from the moisture probes,
- top right: Pasture Forecast – the data from GrassGro™ on pasture and livestock projection,
- bottom left – an information area for the farming system groups to use and where Farming Forecaster training videos are located,
- bottom right – weather details.

For each segment there are buttons which allows you to access more detailed information.

You select a site to view via a box in the top right with a drop-down box listing all 38 locations.

There are some sites that do not have a moisture probe (n=9) so there is no data in the top left segment. The most expensive part of developing a site is the buying, installing and maintaining a moisture probe so the groups decided to expand the coverage of Farming Forecaster by developing sites with just the GrassGro™ and weather outputs. (Thomas *et al*, 2019)

Information provided

Network

There is a 'view network' button on the left-hand side of the front page. This shows a map of the 29 probe sites and this can be examined for daily or monthly rainfall and soil moisture status via a drop-down box. This allows you get a quick idea of conditions on a regional basis which can be useful for marketing or feeding decisions.

Probes

This data is collected daily (check when the last update occurred as this tells you if there has been a communication issue) from the probe network and is displayed as tables or graphs. On the front page the table describes the percentage of available soil moisture at 4 depths, 10, 20, 40, 60 cm. and changes that have occurred over 3 time periods.

By clicking on the 'more detail' button, graphs of the soil moisture at the listed depths are display

over a number of different timeframes. The probes also record soil temperature and rainfall and this data is available. In the rainfall graph the monthly 30-year average (1990 to 2019) from the BOM gridded data is provided. Producers can compare their farm data for the same period against these values to see how their farm sits in relation to the gridded data.

A description and pictures of the soil type at the probes are provided to allow producers to compare their soils to each site.

Pasture forecast

All data in the section has been generated from the GrassGro™ model using farm systems developed in consultation with the producer groups and the BOM gridded weather data.

The graph of green available herbage contains historical data based on the weather from 1990 to 2019. This information is indicated by the shaded coloured areas expressed on a percentile basis. The tactical or forecast data for the next three months is displayed as coloured lines. You can select the percentile lines you want to look at. The black line tracks the actual model performance during the month. A new three monthly forecast is done at the start of each month. The key is to look at how the forecast lines compare to the historical shading for the same percentile.

The more detailed information covers current soil moisture compared to the last 30 years. It shows the potential changes over the next three months for ground cover, female condition score and liveweight of young livestock. The potential supplementary feeding required for all stock is provided in two graphs expressed as a probability, so you can see the risk associated with a short-term feeding strategy. At the top of the detailed section, you have a description of the modeled farm system, covering soil and pasture type and the livestock enterprise used with some details on management and stocking rate.

Weather forecasts

This data is a combination of BOM and CSIRO material. A brief 7-day forecast is on the front-page which includes a sheep grazier's alerts if

appropriate. Next to the alert (sheep icon) is an index value which is based on temperature, rainfall and wind speed. An alert is listed if the value exceeds 1100. In severe conditions this index can exceed 2000, so by listing the value producers can get a feel for the intensity of the weather event.

The more detailed information that sits behind the front page provides a weather forecast on a 3-hourly basis for 7 days and a 3-month rainfall forecast. The information above the forecast should be read before making use of these details.

Farming system groups

There are contact details for the farming system groups in SE NSW.

Discussion

The time and support from producer groups and individual producers over the last two decades has been important in achieving the current program. Key advisors and researchers have used producers' experiences and comments to develop the information and the type of displays used on the Farming Forecaster website.

The new system means that the number of sites and frequency of information can be increased with only minor extra costs. There is the potential for expansion of Farming Forecaster across NSW and there is current interest from groups in Tasmania.

Any new developments to the science underpinning GrassGro™ will automatically

flow to producers without the need from extension programs. New sensing technology could also be aggregated and used by the website. Livestock producers in SE NSW now have the ability to access quality data when they want it to give them more confidence in decision making. The site allows each producer to select the information they need to help with a particular decision. How producers will use the site will vary during the year and between years depending on the circumstance they are facing. It provides data not answers.

The expansion and maintenance of this site will need to be driven by producers if it is to become a long-term tool for livestock producers.

Acknowledgments

The financial support from the Australian Government's National Landcare Program has been critical to the development of Farming Forecaster. This support has also covered the probe network expansion from 2016.

The development of GrassGro™ was also supported by MLA and AWI in the 1990s.

References

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