

Improving Pasture Utilisation using Satellite Technologies

24/04/2024

Introduction

Dairy Up's PI - Unlocking the potential of kikuyu-based systems project, led by Dr Martin Correa-Luna, Sydney University, has been investigating the benefits of using remote sensing and data-based management (PIa) technologies to optimise pasture growth, quality and utilisation. It aims to increase farmer use of real-time monitoring systems to better inform grazing and harvesting decisions that maximise year-round feed production and quality.

Fifteen farms covering the NSW coastal dairy regions, from Bega in the south to Lismore in the north, have been established to ground truth satellite data, input farm data to better inform the tool, and upskill local farmers in the technology.

Pasture.io (<https://pasture.io>) is one of several decision-support tools that use satellite derived pasture measurement. The company has worked with the Dairy Up team to modify the technology for dairy farms using kikuyu/ryegrass mixed pasture systems. Each of the fifteen host farms is supported by a local project technical officer.

Through the use of satellite imagery, soil characteristic, weather and farm management data, Pasture.io maps and predicts pasture growth rate (Kg DM/ha.day) and current available feed (Kg DM/ha or TDM). Accessible via smartphone, this decision-support tool allows both farmer and advisor to enter information on daily pasture management.

To further enhance NSW mixed pasture system accuracy of Pasture.io, ground-based rising plate measurements are also being conducted fortnightly using electronic plate meters. The data is assisting in two ways: (1) To train the models sitting at the back-end of the technology by entering the manually collected paddock level data, and (2) To validate the accuracy of Pasture.io by comparing the satellite measurements against manual measurements.

The farmer- Tim Bale

Tim Bale operates a year-round calving herd of 280 cows on a 150-hectare mixed pasture system at Stewarts River on NSW's mid-coast. He is working with local Project Officer, Josh Hack (Ag Farming Systems) to trial Pasture.io over eighteen months (Figure 1.).

"Often grazing rotation can be guesswork. Pasture.io has given me something to compare my decisions against at this stage. It has certainly focused my rotations- what I'm grazing and how much pasture I am allocating to the herd," says Tim.



Figure 1. Tim Bale and Josh Hack inspect the pasture quality after taking the fortnightly pasture plate meter readings.

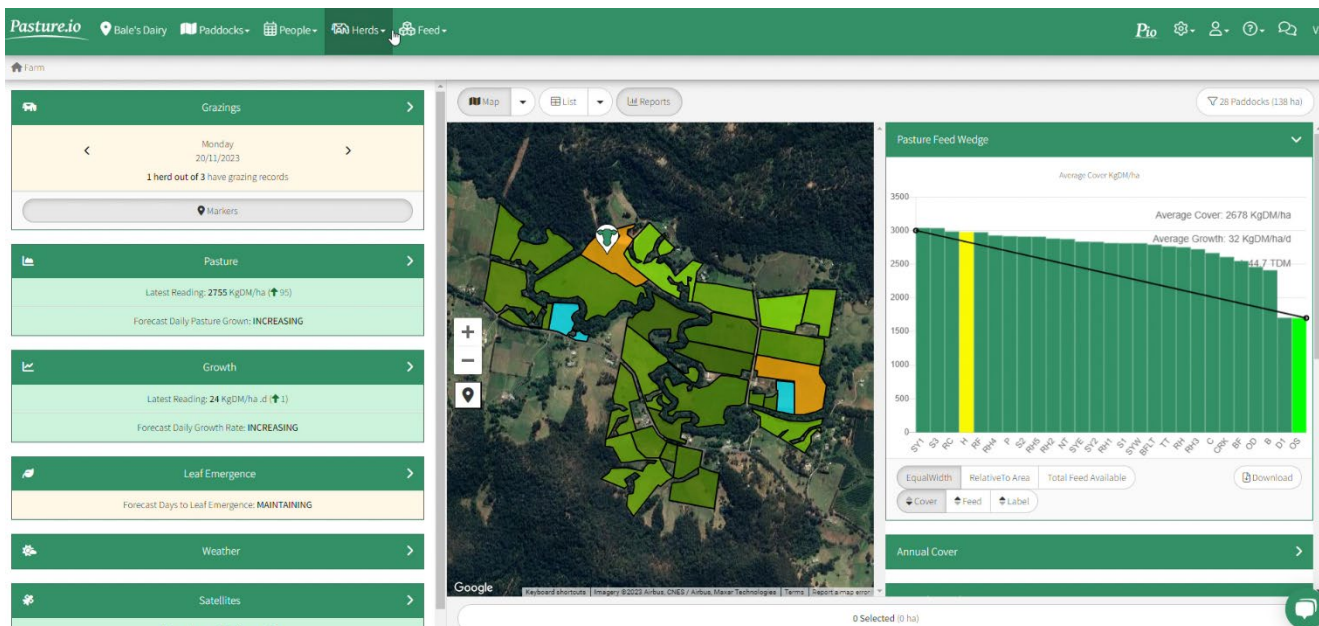


Figure 2. The Pasture.io dashboard showing the current pasture availability and forecast information per paddock as a feed wedge.

Tim believes that he has more confidence in the decisions he is making on where to graze next and where to cut silage as he can easily determine what feed he has ahead if he allocates paddocks to be grazed or taken out of the rotation.

“The feed wedge is a confidence booster (Figure 2.). I can select “milkers only” and it will show the milking platform and I can click on paddocks to take-out for silage at this time of year, then it automatically recalculates the new milking area.”

“The feed wedge is a confidence booster.”

Tim Bale, Stewarts River, NSW

Pasture.io tracks cow movements spatially and daily by GPS. With a myriad of daily decisions to be made, this removes pressure upon Tim’s “memory bank”.

“I like the GPS on the cows as I have an accurate record of where they have been and how long they have been there. I can easily find out when I last grazed certain paddocks.”

The advisor- Josh Hack

From the advisor perspective, Josh Hack, of Ag Farming Systems, believes that having his clients use Pasture.io allows him to provide a more effective and efficient service.

“I can come onto farm and together we can easily bring all the information up on my phone. I can see where the cows have been and what we have on-hand. Together, Tim and I can chat things over whilst in the paddock or in his office,” he says (Figure 3.).

Whilst Tim has yet to explore the full capabilities of the system, he and Josh see real potential in moving paper-based nutrient application records across to Pasture.io.

“The benefit is that Pasture.io quickly tallies fertiliser applications per nutrient. For example, we can accurately see how much nitrogen has gone onto individual paddocks or across the farm to monitor against both the farm nutrient and financial budgets,” says Josh.

With Tim having off-farm business interests also, Pasture.io is a good communication tool for the future between he and his employees.

“I want to set-up Pasture.io access on their smartphones so we are all on the same page when it comes to allocating paddocks and tracking nutrient inputs. I can also start to empower my



Figure 3. Josh Hack and Tim Bale review the paddock data of Pasture.io in the farm office.

employees to make informed decisions if I can't be contacted."

Accuracy of the technology

While Pasture.io has been developed to predict pasture growth rate (KgDM/ha.day) and current available feed (KgDM/ha or TDM), both Josh and Tim believe that it's not entirely accurate...yet.

"The absolute figures are not necessarily reflective of what we are seeing in the manual readings, though what is really accurate is the trends," says Tim.

"What Pasture.io shows as having the most feed is always the paddock we know we should be feeding next. So, the feed wedge trend is definitely accurate."

Josh says there is no doubt the project is improving the accuracy of Pasture.io on mixed pasture systems.

"The plate meter data is being entered into Pasture.io and this is definitely improving the accuracy of the model. Effectively what we are doing is helping to calibrate the machine learning of the platform so Pasture.io can become a useful tool for review and improvement across these systems in NSW."

What the project has demonstrated on technology accuracy so far.

Dr Martin Correa-Luna has used 12 months of calibrated ground-based data (e.g., rising plate meter readings) to improve the machine learning capabilities of Pasture.io. His results demonstrate enhanced accuracy of the tool. Well managed

pastures have been shown to be measured by Pasture.io with an accuracy of +/- 250 kg DM/ha. This comparison has been made using entire paddock imagery data from Pasture.io versus specific transect data from paddocks. Therefore, it may be likely that even greater accuracy is being achieved.

Farmers and advisors involved in the project are excited about the near-future prospect of accurate current and forecasted available feed information at their finger-tips in mixed pasture systems.

"There is no doubt production and profitability will benefit from me and the staff being able to make more informed and confident decisions," says Tim.

For more information

Dairy Up Website

<https://www.dairyup.com.au/project/p1a>

Martín Correa-Luna,
Dairy UP Research Fellow,
Sydney University

E: martin.correa.luna@sydney.edu.au

P: 0422 404 062



Peter Beale,
Senior Land Services Officer, Agronomy,
Hunter Local Land Services

E: Peter.beale@lls.nsw.gov.au

P: 0427 007 468

Delivery organisations



Partner organisations



Additional program supporters, collaborations or partnerships

Charles Sturt University | DairyBio | DataGene | Eagle Direct | Entegra
Macquarie University | smaXtec | UC Davis | University of Technology Sydney
