Final Project Summary

P1c – Kikuyu: Developing new varieties

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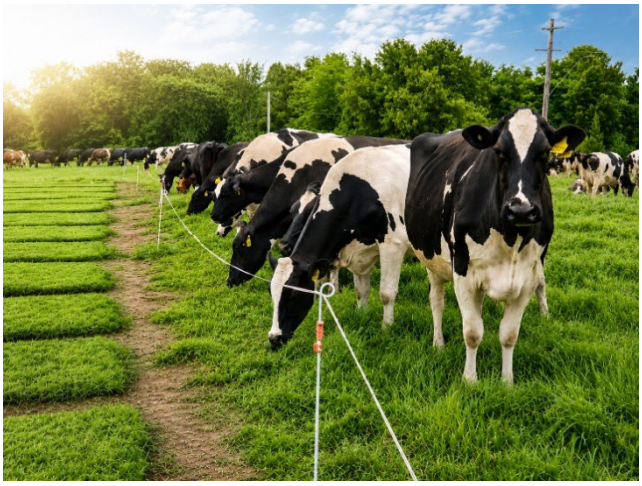

Unlocking the potential of Kikuyu

Dairy UP's P1 project aimed to unlock the potential of Kikuyu pastures used by NSW dairy farmers. P1 was a suite of five projects that collectively explored new management options to grow and utilise more Kikuyu over summer and increase the productivity of Kikuyu-based pastures.

P1a – Kikuyu: Remote monitoring

P1b – Kikuyu Investigating toxicity

P1c – Kikuyu: Developing new varieties

P1d – Kikuyu: Carbon on NSW dairy farms

P1e – Kikuyu: Nutritional value

This document is the final update on P1c – Kikuyu: Developing new varieties.

Kikuyu cultivars

Kikuyu grass is a C4 grass adapted to both the tropics and temperate climates. It is fast growing and produces more dry matter of higher quality than most C4 grasses.

However, since the development of Whittet more than 50 years ago, only two new cultivars for grazing had been released (Acacia and Fulkerson).

Kikuyu genetic research

The University of Sydney in collaboration with Hatton's Turf Research have been breeding improved kikuyu grasses for more than 15 years. These new materials have greater biomass production, tolerance to salinity and drought and represent significant new diversity for nutritional factors.

Industry needs

Current kikuyu pasture cultivars are limited in adaptation, nutritional quality and scope.

However, the extent of adaptation in the new materials developed by the University of Sydney and Hatton's was largely untested in most dairy producing areas in terms of dry matter production, disease resistance and nutritional value. Such information could lead to the commercial release of improved lines and provide a basis for continued breeding and selection.

Project aims

This project explored and evaluated promising lines of kikuyu that had been selected for increased biomass production and tolerance to salinity and drought.

Key findings

The Dairy UP team identified three candidate lines of kikuyu with potential commercial value for dairy pastures.

All three candidate lines had similar dry matter production to the varieties currently used on NSW dairy farms (Whittet and Fulkerson).

Two lines had better nutritional value and were

more resistant to black spot and kikuyu yellows than Whittet.

These two lines offer dairy farmers valuable new genetic diversity with enhanced nutritional quality and disease resistance at an equivalent yield.

Path to market

Collaboration with a commercial partner provides a clear path to market.

Once superior lines have been confirmed Hatton's Turf have the option to progress with multiplication, dissemination and marketing.

Benefits

Given that Australia's pasture lands are increasingly subject to moisture stress and warmer temperatures, this climate-ready pasture could provide greater flexibility to the animal industries including dairy.

More info

P1c Final report

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Research and results

Thirteen distinct kikuyu genotypes owned by Hatton's Turf Research Pty Ltd, were selected to be evaluated in small, replicated plots at the Plant Breeding Institute at Cobbity during 2021/22. Two commercially available varieties (Whittet and Fulkerson) were included as controls.

The plots were exposed to natural conditions. Soil nutrient/moisture and daily weather were assessed throughout the experimental period. Plots were cut for biomass assessment at key periods of the year and rate and extent of re-growth assessed. Materials were screened for nutritive value and local adaptation. Concurrent pot studies were conducted in a hydroponic system for more detailed assessment of nutritive traits.

The same traits were assessed in the field at both locations for comparison and determination of stability.

Lines with potential

Based on the results, three new kikuyu lines were identified as candidates with potential commercial value. These were screened with larger plot trials in 2022/23.

Results from the initial plot trials indicated the three candidate lines were resistant to disease and grow quickly with high yields over 12 months (more than 14 tonnes/ha/yr). Their nutritional values were high in terms of crude protein, water soluble carbohydrates and fibre.

The 2022/23 plots were used to produce enough runners to establish field trials.

Field trials

The three candidate lines (and Whittet as a control) were further assessed in 2024/25 through replicated strip trials on three dairy farms in southern NSW (Bega, Berry, Corstorphine).

The trials ran from November to May with the strips managed as closely as possible to the farm's practices. Biomass was monitored using remote sensing technology and a rising plate meter. Grazing was allowed on one half of the trial and samples were collected for analysis from the mowed treatment. Biomass yield from mowing was used as a proxy for grazing and to compare with the grazing treatment.

Given the wet conditions during the 2024/25 trials, further field trials were conducted over the 2025/26 summer to better understand the performance of the candidate lines under different seasonal conditions.

Disease resistance

Lines were assessed for disease resistance in glasshouse trials where plants were inoculated with either black spot or kikuyu yellows.

To further investigate disease resistance, the 2025/26 trials included in field inoculation of black spot and kikuyu yellows.

Two of the three candidate lines were more resistant than Whittet to black spot and kikuyu yellows.

DNA testing

Throughout all trials, samples were collected for DNA testing. In addition, samples have been collected from regional dairy farms for testing.

The DNA analysis revealed more genetic diversity than expected with just 35% of sampled sites aligning with the Whittet and Fulkerson lines.

The three candidate lines are genetically distinct from the ones currently available commercially (largely Whittet, Fulkerson and Acacia).

Kikuyu toxicity

Several lines were concurrently tested in Dairy Up project P1b for differential toxicity response. PhD student, Vivien Tan, worked across both P1b and P1c to document outcomes.

There appears to be a relationship between kikuyu toxicity and kikuyu lines.

Conclusions and recommendations

Significant genetic diversity in kikuyu pastures was observed across the sampled sites in NSW with just 35% of sites clustering with Whittet and the Fulkerson line.

The new candidate kikuyu lines are genetically different and distinct from Whittet and the Fulkerson variety and generally different to most other pastures.

There appears to be a relationship between kikuyu toxicity and kikuyu lines.

Kikuyu lines do not differ significantly for dry matter at each date of sampling nor cumulative dry matter across two summer seasons.

Two lines have potential for release as new varieties based on genetic diversity, dry matter production (equivalent to Whittet), better black spot resistance (better than Whittet), resistance to yellows disease (better than Whittet and equivalent to Fulkerson) and superior nutritional profile (better than both Whittet and Fulkerson).

Priorities for future

- Further evaluate the two identified lines in the Hunter region and the NSW north coast.
- Retest and confirm the kikuyu yellow resistance.
- Further investigate the suggested link between kikuyu genotype and toxicity.

Collaborators

The P1c project was a collaboration between researchers from Dairy UP, University of Sydney and Hatton's Turf.

Delivery organisations

The University of Sydney Dairy Research Foundation | NSW Government Department of Primary Industries and Regional Development | Sibus | Dairy Australia

Partner organisations

NSW Farmers Growing the best | eastAUSmilk | Dairy NSW Dairy Australia | AFMH | Leppington Pastoral Company Pty Ltd | NSW Government Local Land Services | Norco

Additional program supporters, collaborations or partnerships

Charles Sturt University | DairyBio | DataGene | Eagle Direct | Entegra
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