

P1b Kikuyu: Investigating toxicity



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 P1b – Kikuyu: Investigating toxicity

Kikuyu is a perennial pasture species commonly grown in NSW for livestock production. It is classified as a C4 grass meaning it is adapted to warm or hot conditions. Kikuyu is fast growing and produces more dry matter – of higher quality – than other C4 grass varieties.

However, there's still a lot to learn about kikuyu toxicity – a risk for livestock producers.

Kikuyu toxicity

Cattle deaths and illness officially linked to kikuyu poisoning are rare but have been recorded in NSW over the past 20 years.

Kikuyu poisoning, or toxicity, is frequently associated with specific environmental conditions and new growth following heavy rainfall, often after a summer drought or prolonged dry conditions.

Cause

The compound or mechanism that makes kikuyu toxic to cattle under these conditions is unknown. Kikuyu toxicity is difficult to research because of the unpredictability and rarity of kikuyu poisoning. The only definitive way to determine if cattle have kikuyu poisoning is a combination of the history, clinical signs, and specifically looking for damage to the forestomach (necropsy findings).

Specific signs linked to kikuyu toxicity include dehydration, sham drinking (trying to drink but unable), abdominal pain, unsteady

gait, drooling and death. But not all cattle suffering from kikuyu poisoning present with these signs. In some instances, animals may recover, although they will not be as productive as before, given the damage to the digestive system.

Some affected cattle are reported as kikuyu toxicity cases; however, many remain unreported, with their illness blamed on other causes or not investigated.

Project aim

DairyUP researchers wanted to find out why kikuyu can become toxic, to help find ways to prevent or manage it.

Providing clarity around kikuyu toxicity would inform future grazing management practices and research.

Ultimately, project findings could be used to develop new kikuyu varieties that are less susceptible to toxicity events, diagnostic tests to evaluate pasture safety, in-field preventative treatments and treatments for affected cattle.

Benefits

Although kikuyu poisoning is infrequent, it remains a risk and can prevent dairy farmers from unlocking all the benefits of kikuyu.

Understanding the underlying reasons for kikuyu poisoning would give dairy farmers more confidence using kikuyu as a feed option – potentially providing more homegrown feed alternatives year-round.

Any findings could benefit Australia's entire livestock sector. As well as affecting dairy and beef cattle, kikuyu poisoning can also affect sheep and goats, although they are less susceptible.

Key findings

Findings from this research weaken the evidence for *Fusarium torulosum* as the primary cause of kikuyu toxicity. Although this fungus was previously found in affected pasture, our results suggest other plant or microbial compounds may be involved.

This work provides a foundation for future diagnostic tools and evidence-based pasture management strategies to help reduce toxicity risk.

Supporting findings:

- Kikuyu variety strongly influenced plant metabolite profiles, suggesting some cultivars may carry lower toxicity risk.
- Seven compounds were consistently elevated in leaf and stem samples from toxic pastures, making them strong candidate biomarkers of toxicity.
- Re-watering after drought triggered greater biological change in kikuyu grass than drought alone.
- *Fusarium torulosum* declined after re-watering and was not consistently associated with toxic pastures.
- One fungal species was consistently elevated in toxic pastures and warrants further investigation.

More info

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Research and results

On-farm monitoring

The team collected and analysed grass and soil samples from properties across NSW. An average sample of grass from a paddock contains hundreds of microbial species and thousands of secondary metabolites.

Samples from unaffected and historically affected farms provided a reference "baseline" for comparison with samples collected during active or suspected kikuyu toxicity events.

Dairy UP researchers visited the farms affected by the following suspected kikuyu poisoning events:

- 2018-19: Hunter Valley.
- March 2024: Bega (unconfirmed).
- April 2024: Hunter Valley.

Farmers on affected farms gave their observations of kikuyu poisoning.

Samples collected from the reference and affected farms were analysed for fungal and bacterial communities (microbiome analysis).

A technology called metabolomics was used to examine samples from the reference and affected farms. Metabolomics gives a "fingerprint" of the many compounds present in a grass sample. Researchers identified potentially toxic compounds by comparing compounds in the database from unaffected and affected farms.

Findings

Several fungal species were significantly more abundant in toxic samples. One fungal species was consistently elevated across leaf, stem and soil samples from toxic pastures. It is now being investigated further as a potential contributor to kikuyu toxicity.

Importantly, *Fusarium torulosum* – a fungus frequently found in affected kikuyu pasture – was not significantly enriched in toxic pasture samples. This fungal species is known to produce metabolites that can cause stomach lesions in laboratory animals.

Metabolites: The team identified seven metabolites that were consistently elevated in both leaf and stem tissue from toxic samples but low or absent in the unaffected and historical samples. These compounds are considered the strongest candidate biomarkers or potentially toxic compounds identified in the project to date.

Fungi: Samples from toxic pastures appeared to have less diversity and richness of fungi in the leaf and stem tissue. ■ ■

Read more

[P1b final report](#)

Tan et Al. 2025
Effect of drought
on microbiome
community and
metabolite profiles
in kikuyu. [ADSA
abstract](#).

