



Research into management solutions for pasture dieback

Scientific research

The Department of Agriculture and Fisheries (DAF) is conducting scientific research to determine effective management solutions for pasture dieback. Multiple replicated trials are underway including:

- Pasture species comparison trials
- Management option trials on:
 1. Completely affected pasture (i.e. dead pasture)
 2. Partially affected pasture (i.e. symptomatic but not dead)

Of the techniques being researched, burning, slashing, fertilising, renovating only, spraying fungicides or insecticides have demonstrated inconsistent improvements in pasture yield to date. Re-seeding with legumes or forages have been successful to restore productivity.

Research into multiple causal agents is being conducted. The pasture mealybug (*Helicococcus summervillei*) and ground pearl (*Margarodes australis*) have been associated with pasture dieback. DAF and Queensland University of Technology (QUT) are researching pasture mealybug, and the University of Queensland (UQ) is investigating ground pearl. Other pathogenic organisms including nematodes, fungi, viruses and bacteria are also being investigated by DAF. It is unlikely that directly targeting any of these with pesticides will be an effective management solution due to cost and application practicality issues across extensive grazing lands.

In some cases, affected pastures have recovered without any intervention. However, recovery has been inconsistent and should not be relied upon as a solution to this condition. Land managers are encouraged to seek professional advice when determining options applicable to their situation.

Fact sheet 3

Research into causes

Multiple research activities are currently underway, however none to date have definitively identified the exact cause of pasture dieback. Multiple pathogenic organisms (e.g. insects, fungi, viruses) could be interacting simultaneously with environmental stress.

Management solutions to restore lost productivity

While pasture dieback has occurred before, past research was unable to identify effective management solutions. Current field trials have shown perennial legumes and annual forages are unaffected by pasture dieback. These have performed well when sown into affected paddocks. Depending on type, forages and perennial legumes can provide short and long-term feed and are currently recommended as a solution to restore productivity.



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DAF's Pasture species comparison trials

The pasture species comparison trials include multiple grasses, with one trial also including legumes. Trial species are outlined in the table below.

Location	Grasses	Legumes
Brian Pastures, Gayndah. (Soil: Black vertosol. Original pasture: Bisset creeping bluegrass. Trial sown: March 2019)	Rhodes grass (multiple) Panic grasses (multiple) Digit and Finger grass Bluegrass (multiple) Buffel grass (multiple) Signal grass Setaria	Milgara butterfly pea Progardenes desmanthus Caatinga stylo Aztec Siratro Presto burgundy bean
On-farm trial, Boonah. (Soil: Brown dermosol. Original pasture: Callide Rhodes grass. Trial sown: February 2020)	Rhodes grass (multiple) Panic grasses (multiple) Digit and Finger grass Bluegrass (multiple) Buffel grass (multiple) Signal and hybrid Brachiaria Setaria Paspalum Kikuyu	None



Species comparison trials: Brian Pastures (above left), Boonah (above).

Findings to date

Brian Pastures trial, Gayndah:

- All perennial legumes have grown well. Sowing legumes that are suitable to the situation is a general recommendation to restore short and long-term productivity when paddocks are affected by pasture dieback.
- Buffel grass – especially cultivar Gayndah – showed leaf reddening and yellowing within weeks of germination and establishment. Most plants died about three months after sowing.
- All other successfully established grasses, including Bisset creeping bluegrass (the original affected pasture species at this site), have performed well given the seasonal conditions experienced.

On-farm trial, Boonah:

- After the initial 2-3 months, establishment and growth differences were observed between grasses. All that established continue to have very poor root systems. Rhodes, buffel, and some panics established well, whereas kikuyu, paspalum, and setaria did not.
- By 5-6 months after sowing, patches are dying out in the Rhodes grass treatments. Many other grasses have retarded growth.

DAF's Management options trials

The management option trials at Brian Pastures started in Spring 2018 and are ongoing. The impacts of thirteen treatments (listed in the table below) are being investigated in a completely affected (dead), or partially affected, Bisset creeping bluegrass pasture.

Treatment	Details
Control	Untouched existing pasture
Fungicide application	Multiple applications / season on existing pasture
Insecticide application	Multiple applications / season on existing pasture
Burn	Spring burn existing pasture
Slash	Spring slash existing pasture
Cultivate	Single cultivation of existing pasture
Fertiliser	NPKS blend applied on existing pasture
Forage sorghum	Remove pasture, sow forage, re-sow Bisset
Lablab	Remove pasture, sow Lablab, re-sow Bisset
Oats	Remove pasture, sow oats, re-sow Bisset
Cultivate, fallow 3 months	Remove pasture, re-sow Bisset after fallow
Cultivate, fallow 6 months	Remove pasture, re-sow Bisset after fallow
Cultivate, fallow 6 months complete	Remove pasture, re-sow Bisset after fallow, apply fungicide and insecticide on new pasture

Findings to date

Trial 1 (dead pasture):

- Regeneration of the original pasture from the soil-seed bank is occurring
- Angleton grass (*Dichanthium aristatum*) population is increasing in several plots, though there is no significant difference in the proportion between treatments
- No consistent differences in pasture health or yield have been measured for any treatment imposed on retained pasture
- Annual forage crops have performed well given the seasonal conditions

Trial 2 (affected pasture):

- Bisset creeping bluegrass is still being affected by dieback. Grass species composition shift is being observed with Angleton grass population increasing over time
- Annual forage crops have performed well given the seasonal conditions
- Spring burn provided short-term benefit (greener) only
- Slashing didn't provide any benefit
- Spraying with broad spectrum fungicides or insecticides hasn't consistently improved pasture health or yield
- Fertilising with a blended fertiliser provided minimal benefit to the affected grass-pasture, but legumes responded well



Photos top to bottom:
1. Forage sorghum and
2. Caatinga stylo growing well on paddock affected by dieback at DAF's research trial at Brian Pastures, Gayndah.

Current findings from the management option trials indicate there is limited to no productivity benefit in treating affected pasture with pesticides or fertiliser, or burning or slashing. Productivity improvements are more consistent when the existing pasture is removed and either annual forages or perennial legumes are sown.



DAF's trial sites at Brian Pastures, Gayndah.

DAF's research is ongoing

DAF is investing significant resources to find answers to pasture dieback. The multi-disciplinary team of specialists (entomologists, virologists, mycologists, agronomists, economists, and beef extension staff) are undertaking scientific research to identify causes and effective management solutions. DAF is collaborating with other research organisations to ensure our work is complementary and progresses scientific knowledge. Existing field research will continue and new field trials are planned in central Queensland to expand research in other pasture systems. Any graziers with pastures affected by dieback who wish to learn more about this condition and potential management solutions are welcome to register for the DAF Pasture Dieback Industry Network. Registration is via the FutureBeef website www.futurebeef.com.au, search for pasture dieback, then Pasture Dieback Industry Network.

Where to get more information

- FutureBeef: www.futurebeef.com.au
 - Fact sheet 1: What is pasture dieback?
 - Fact sheet 2: How to identify pasture dieback
 - Fact sheet 4: How to manage pasture dieback
 - Pasture dieback: past activities and current situation across Queensland report
- Meat & Livestock Australia: www.mla.com.au
- New South Wales Department of Primary Industries: www.dpi.nsw.gov.au

Who can producers contact about pasture dieback?

The DAF team is encouraging graziers affected by dieback (existing, new, or recovered) to make contact. This will help us understand this condition better, and to provide any available assistance. Please call the DAF Customer Service Centre on 13 25 23.

You can also contact:

Stuart Buck, Pasture Agronomist and DAF Pasture Dieback Project leader
(07) 4843 2605 or stuart.buck@daf.qld.gov.au

Nicholas Brazier, Pasture Agronomist
(07) 4843 2631 or nicholas.brazier@daf.qld.gov.au

Or visit your local DAF office and talk to a DAF extension officer.

Compiled by Stuart Buck, DAF Rockhampton. March 2021



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