RESEARCHERS at The University of Queensland are investigating how fire and grazing can be managed to optimise nitrogen inputs by biocrusts to improve the productivity of grazing lands in northern Australia.

In the research funded by Meat & Livestock Australia - biocrusts are being put through their paces at the Kidman Springs fire experiment 400 kilometres south of Darwin (NT Department of Primary Industry and Resources) and the Wambiana Grazing Trial in north Queensland (QLD Department of Agriculture and Fisheries).

What are biocrusts?
Biocrusts are the ‘living skin’ on the surface of the soil and are made of many tiny organisms including cyanobacteria, fungi, green algae, bacteria, lichens, liverworts, and mosses.

They grow where it’s wet or dry and become inactive when it’s dry, just like plants.

Why do we care about biocrusts?
They stabilise the soil surface by intertwining with soil particles to bind them together, preventing erosion from wind and water. They photosynthesise and fix carbon - algae, cyanobacteria, lichens, liverworts, and mosses are all green and photosynthesise just like plants.

The carbon they pull out of the air is incorporated into the soil and enhances soil carbon. They fix nitrogen! Most cyanobacteria fix nitrogen out of the air just like legumes do. They use the nitrogen to grow but store any excess nitrogen they fix in a slimy layer around their cells.

When it rains, much of this plant-available nitrogen enters the surrounding soil and is available for pastures. In the dry season the biocrusts dry out and partly disintegrate.

This nutrient-rich biocrust is incorporated into the soil as organic matter with early wet season rains. The amount of nitrogen that biocrusts fix every year is similar to the amount of nitrogen fixed by native legumes in our grassy tropical savannas.

Soil fertility is a major limitation to pasture growth in tropical savannas, but it doesn’t pay to add fertilisers at these extensive scales. We are testing if we can manage grazing and fire to maximise the natural carbon and nitrogen inputs by biocrusts into soils and enhance soil fertility and productivity in tropical savannas.

BIOCRUSTS

- Biocrusts cover 12 per cent of the earth’s land surface and fix 7pc of the terrestrial carbon and 45pc of the plant-available nitrogen.
- At Kidman Springs in the Victoria River District and Wambiana at Charters Towers, up to 70pc of the ground cover is biocrusts.
- Savanna grasses have higher growth with biocrusts, probably because they benefit from the extra nitrogen fixed by the biocrusts.

Where are biocrusts?
They are in the top one to two centimetres of the soil, usually covering the bare ground spaces between plants.

Biocrusts are found all over the world from freezing Iceland and Antarctica to hot deserts and savannas. In tropical savannas, biocrusts are dominated by cyanobacteria and liverworts.

What do they look like?
In Northern Australia biocrusts often appear as dark staining on the soil surface in the dry season (top left) and dark green slimy films during the wet season (top right).

But wait, aren’t soil crusts a bad thing?

There are two types of soil crusts. Living biocrusts are distinct from dead physical crusts that form on degrad-ed soils. Physical soil crusts can inhibit water infiltration and plant growth. Living biocrusts enhance soil moisture, soil fertility and plant growth.

What effect do fire and grazing have on biocrusts?
Fire can enhance biocrusts by removing litter, trees and shrubs that would otherwise compete as ground cover, yet you need the right amount of fire; not too much, not too little. Biocrusts in Australia’s tropical savannas, like our native vegetation, have evolved with fire and hence are well adapted to fire.

Biocrusts from Kidman Springs regrew just as well after fire as unburnt sites. During the wet season burnt biocrusts on alluvial soils grew faster than unburnt biocrusts.

Grazing can also potentially open spaces for biocrusts by reducing plant cover, nevertheless, the trampling by hooved animals is not something Australian ecosystems have evolved with, so our biocrusts are quite susceptible to heavy trampling.

At the Wambiana Grazing Trial near Charters Towers, biocrust cover was higher and healthier with moderate grazing than with heavy grazing.

How can we manage grazing to benefit biocrusts?
During the dry season biocrusts dehydrate and become dormant.

The carbon and nitrogen they fix is broken down and recycled by other critters in the biocrust, and then becomes incorporated into the soil and available to plants. We suspect that spelling over the wet season while biocrusts are actively growing and grazing during the dry season when they are dormant, will not only benefit palatable plants, but also biocrusts, allowing them to maximise their growth and nitrogen fixation.

To find out more visit futurebeef.com.au (search for ‘biocrust’). The Kidman Springs experiment is a joint initiative of Meat & Livestock Australia, Northern Territory Department of Primary Industry and Resources, 0418 246 001.

Wendy Williams, The University of Queensland, 0418 246 001.
LEAD poisoning continues to remain a common cause of cattle death.

Animals may find material contaminated with lead in silage, rubbish dumps and around farm buildings and machinery. Lead can be present in:
- discarded sump oil and oil filters
- lead batteries
- flaking lead-based paint or old paint tins
- lead shot and fishing sinkers
- linoleum, grease, putty, metallic lead.

Discarded batteries are the most common cause of lead toxicity in cattle. Battery cases become brittle over time and are easily broken by inquisitive cattle. The lead and lead salts that they contain are easily accessed and readily licked or eaten by stock.

Animals are likely to seek out sweet-tasting lead compounds if they are bored from being confined or have changed appetites from malnutrition or phosphorus deficiency.

Cattle are at most risk of lead poisoning because they are inquisitive and commonly ‘taste test’ new finds including old batteries, flaking lead paint, sump oil, ashes and just about any other potential lead source they find.

Lead poisoning risks can increase during drought. Hungry stock may develop a depraved appetite, particularly if also suffering trace element or mineral deficiencies. Hungry stock are also more inclined to break into ‘no-go’ areas, such as around farm sheds or the farm rubbish tip, where there is some residual feed, or where stock may be held in house paddocks to make feeding easier.

Less pasture cover makes it more likely that stock will find hazards such as old batteries.

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Online training courses and workshops are planned for the end of the year, call 13 25 23.

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The easiest and most effective way to protect your production animals from lead poisoning and contamination is to dispose of lead safely.

Never dispose of toxic waste in general rubbish dumps or bins.

Local councils usually provide options for toxic waste disposal.

Local garages may dispose of sump oil and car batteries for you, and some scrap metal merchants will purchase lead batteries.

If you suspect your animals have been exposed to lead, contact your local biosafety officer and seek veterinary advice immediately.

"There have been six major updates to this herd budgeting tool since it was developed and this year we have moved the program online," DAF grazing economist Tim Moravek said.

"Improved usability, information sharing and help guides are included and the online tool improves the ability to be helped remotely by agricultural economists based in regional Queensland."

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Woolsheds 2
Andrew Chapman & Tim Lee
The first volume of Woolsheds, published in 2012, was a huge success, selling more than 30,000 copies. This latest volume is packed with stunning pictures and engaging stories about woolsheds, woolgrowers, shepherds and rundown outback stations. Australia, along with an additional section on New Zealand.

**Price:** $54.99

The Digger's View - WWI in Colour
Juan Malhoney
Offers an unprecedented view of Australia’s military history – the way the soldiers saw themselves during the 1914-1918 period. Brought to life in full colour, the images provide a unique perspective of war. Take a look at World War 1 through the eyes of those who have become such an important part of modern Australian history.

**Price:** $59.95

Life as an Australian Horseman
Fiona Lake
This book begins with the pre-dawn catching and saddling of stock horses and proceeds to mustering, dinner camp, walking huge mobs, yarning up and stockcamp experiences to branding and loading roadtrains. The story unfolds at isolated homesteads, among the机械isation of country life and careful nurturing of outback gardens. A distinctly original book, full of quirky details.

**Price:** $49.95
**Great potential to integrate sheep and lambs**

The benefit of diversification

THERE is great potential for farmers in closely settled areas to integrate sheep and lambs into their mixed farming operations, with diversification and effective management key to driving profitability, particularly in drier times.

That’s according to Stuart and Pru Barkla, who together manage their 160-hectare property, ‘Mt Molar’ Clifton, Queensland, where they currently run 130 breeding ewes, 200 goats and a lamb trading enterprise.

“Diversification has been key to the sustainability and profitability of our enterprise, offering a more balanced business and giving us the opportunity to better manage risk,” they said.

“Integrating sheep production in our business involved investing in a good set of sheep yards and completely fencing the boundary with an exclusion fence.

“Due to consistent dry seasons in our region, our sheep production has enabled us to maintain our business throughout this drought and continue to optimise the use of our land and pasture through rotational grazing in conjunction with supplementary feeding.”

The Barklas said management decisions around how to optimise livestock production significantly impact productivity and profitability in mixed farming enterprises.

“You must ensure you have the capacity and strategies in place to mitigate risk of mortality to your livestock, for example protecting your flock from feral animals and dog attacks,” they said.

“We participate regularly in 1080 baiting programs, which assists in both the control of feral animals and protects our Australian native animals and birds.”

Although living in these areas provides easy access to assisted feeding and other resources, producers need to look for ways to optimise their business and ensure the safety of livestock, from exclusion fencing to ensuring sheep genetics are suited to the region.

“If you’re considering diversifying your enterprise into sheep production, seek professional advice so you have a better understanding of your business’s potential, to guide your future management decisions.”

Time to take stock of your weaning options

WITH BOM issuing a La Nina watch, variable summer rain likely and much of Queensland still in drought, live-stock producers are urged to maintain flexibility in their businesses and take stock of their management options for weaning lambs.

Milly Nolan, extension officer with the Queensland Department of Agriculture and Fisheries (DAF), said producers need to be aware of management strategies that can be used to minimise stress and in turn, mitigate risk of weight loss, mortalities and tender wool.

“When looking at wean- ing management options, the live weight of the lamb should be the key consideration, with a higher weight resulting in a greater chance of survival and therefore success,” Milly said.

“Early weaning for one, decreases feeding costs through targeted nutrition and allow for greater flexibility in ewe management decision-making and earlier implementation of worm control programs in lambs. “If early weaning is done in the yards, it can help ensure that lambs are given the best feed, allowing weaning to occur when lambs are at even lighter live weights.”

“Compared to traditional methods, yard weaning has shown to minimise lamb weight loss, reduce stress through quicker adaptation to ewe separation, and allow for closer monitoring for flock health.”

Leading Sheep has released nine short clips recorded from the ‘Weaning in DRY Times’ webinar, visit leadingsheep.com.au and search ‘weaning in dry times’.

To find out what tools are available to help wool producers manage varying seasonal conditions, contact leadingsheep@daf.qld.gov.au.

Leading Sheep is an important partnership between DAF and Australian Wool Innovation, and is supported by AgForce.

Great potential to integrate sheep and lambs

Producers looking to get into sheep can learn from Australia’s industry experts via the ongoing H Series of webinars featuring information from across sheep and wool production topics.