Foreword

The world in which we live and farm is constantly changing due to factors that are often beyond our control, like the weather and more recently the availability and rising of input costs For farming business to be successful they need to be able to incorporate and embrace these changes into their business. In order to flourish, rather than just cope, in this changing environment farmers will need to keep abreast of new technology and research.

Many agricultural projects are undertaken annually across Kangaroo Island and this booklet presents the information in a format that allows the reader to quickly gain an overview of each project and the key findings and how they might apply to their own business operations. Contact details are provided at the end of each article so that further information about each project can be sourced if required. This booklet represents another example of how Island and off-Island organisations have worked together for the betterment of agriculture and natural resource management on KI.

Many thanks to the local PIRSA staff (especially Lyn Dohle) who manage this project and to PIRSA's partnership funding which pays for the printing and postage. Thanks also to the researchers and project staff who contribute papers and the individual sponsors of the many trials and projects included in this booklet.

Jamie Heinrich, Chair, AgKI.

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Note on the use of QR codes

We are increasingly using QR codes in this publication to direct you to further information online, as lengthy addresses are unwieldy to follow from a print publication. Most phone cameras will read the code and ask if you want to be directed to the site. However, if you'd prefer to read on your computer, enough information is given alongside each code for you to find the page via a search engine such as Google.

Contents

An Update from AgKI

AGRICULTURE
KANGAROO ISLAND

Agriculture Kangaroo Island is the peak body for agriculture and primary production on Kangaroo Island. With approximately 150 members, we represent members across the breadth of the island, including both grain and livestock producers, along with other farming and production activities.

In 2021/22, AgKI continued to:

- represent members' interests on the Bushfire Recovery Committee
- support members in post fire activities
- work with the other Island industry associations, KI Business and Brand Alliance (KIBBA) and KI Tourism Alliance (KITA) regarding our joint Local Economic Recovery projects.
- support feral pig and feral cat eradication projects
- build on our strong relationships with new Landscapes Board and National Parks, particularly when it comes to developing the updated Kangaroo Island National Parks Fire Management Plan
- successfully advocate for funding, services and support for the agricultural sector on Kangaroo Island, post bush fires
- represent views of members in the numerous reviews regarding the KI fires
- seek clarity on clearing of fence lines, paddocks, driveways and general fire management clearance.

Additionally, AgKI has worked with KIBBA and KITA to present a united voice in lobbying the incoming Government regarding those issues affecting the whole of KI (e.g., housing, access and bushfire management).

We have continued to deliver research and extension, as a result of grant funding, for the following projects:

- Healthy Soils
- Soil Acidity
- Producer Group
- Mixed Cover Cropping
- Technology and tools to increase adoption of smarter and more sustainable farming practices.

We have also received funding through the Innovation Grants to partner with Livestock SA on the following projects:

- Feral Cats
- Oestrogenic Clover
- Soil Probes
- Roadside Weeds.

Additionally, we have gained funding to engage administrative support to strengthen governance structure and build membership, so that AgKI can continue to build on the advocacy services and research projects to ensure the Agricultural Sector on the Island retains its reputation for innovation and transformation.

We continue to work with key partners to ensure that our members are well represented, recognising that agriculture/primary production is the largest industry sector on Kangaroo Island.

MLA Agriculture KI Conference 2021/22

The biennial conference, the MLA Agriculture Kangaroo Island Conference 2021/22, was eventually able to be held on 4 March 2022, after being postponed due to COVID restrictions. The conference was attended by approximately 120 AgKI Members and Partners and representatives from the agricultural sector at the Kingscote Town Hall.

Guest speakers included keynote speaker MLA's Phoebe Johnson, who gave a world market update on lamb, while inventor Dr Nick Berry spoke on his journey from a KI farm kid to growing his company Seed Terminator.

Other speakers included neXtgen Agri co-founder Mark Ferguson on the 'future ewe'; Thrive Agri Services' Andrew Kennedy on optimising sheep production systems; Jigsaw Farms principal Mark Wootton on dealing with climate change; and Achieve Ag consultant Nathan Scott on livestock biosecurity and traceability.

The conference culminated in a panel discussion with speakers addressing Island specific issues, which included an overview of the forestry to farmland project, as explained by Iain Elgin from AAGIM, the management company employed by KIland, formerly Kangaroo Island Plantation Timbers. Fiona Gill from National Parks and Wildlife Service SA provided an update on the Fire Management Plan, while Laura Williams and Matt Korcz from PIRSA spoke to their projects – weeds and feral pig cull. Will Durack from Landscape SA took the opportunity to talk about strengthening relationships and getting the balance right between the farming community and environmental groups.

The day ended in a belated celebration of AgKI's 25th anniversary which fell in 2021. To mark the occasion, the Inaugural AgKI Life Membership was presented to Lyn Dohle to the formidable contribution she has made to the Kangaroo Island Agriculture sector. This presentation was followed by a barbecue prepared by the KI Chapter of Black Dog Ride, sponsored by Junction Kangaroo Island Community Centre and AAG IM.

Our Board Members have continued to work hard, in a very busy and challenging period. The current board members are:

Jamie Heinrich (Chair)

Steph Wurst (co-Deputy Chair)

Tim Buck (co-Deputy Chair)

Rick Morris

Caleb Pratt

Grant Flanagan

Caitlin Berry

Simon Veitch

Cr Sam Mumford (Council representative)

Lyn Dohle (PIRSA representative)

Jo Sullivan (KI Landscape Board representative)

We acknowledge our partners, whose assistance allows us to support and advocate for our members:

Platinum Partners

Meat & Livestock Australia (MLA)

Primary Industries & Regions South Australia (PIRSA)

Landscape South Australia Kangaroo Island

Gold Partners

NBN Co.

ANZ Bank

Nutrien Ag Solutions

Silver Partners

G. & J. East (Strathalbyn)

Elders

Lawrie & Co

Bronze Partners

Rabobank

Australian Wool Innovation Ltd

Partners

Ella Matta

Stoller

To Contact AgKI:

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Email: admin@agki.com.au

Website: www.agki.com.au

Join now

If you would like to become a member of AgKI and gain the many member benefits, please fill in the slip on this page and post it along with your payment. For more information or if you would like a membership brochure emailed to you with the BSB details, email to: admin@agki.com.au.

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PO Box 794
KINGSCOTE, SA 5223

AgKI Members Digital Media Survey

Background

AgKI understands the importance of delivering educational and community objectives to its members in an efficient and engaging way. Media platforms are ever-changing and expanding, putting time poor farmers at risk of being overwhelmed with information from all angles. AgKI surveyed Kangaroo Island farmers to determine how they prefer to receive agricultural information.

What was done

A ten-question survey was delivered to 51 random Kangaroo Island farmers via phone (25), in-person (20), or online (6). The sample equated to approximately 30% of AgKI members and 13% of the Island's farming community. Ninety-two per cent of the respondents were property owner/managers or had recently retired, and the remainder were agricultural consultants or State Agency agricultural professionals. There were the same number of farmers aged 50 or younger as there were above 50. The geographic distribution of respondents was representative of the major farming region, the central eastern part of the Island; with 24% farming in the Hundred of Menzies, 18% in MacGillivray, 14% in Seddon, and 12% each in Dudley and Duncan.

Results

Email was the most preferred way to receive agricultural information; followed by text and the local paper, which included the Stock Journal. Twitter was less favoured despite half of the respondents being aged 50 or under. However, the results indicated that the group messaging app, WhatsApp, may have replaced Twitter to some extent; particularly within industry peer groups and for intra-business communication. Respondents aged 40 or younger placed less reliance on the local paper than those older than 40. They were also more likely to use all forms of social media, with WhatsApp and Instagram showing the greatest use.

All respondents indicated a high level of confidence and ability using their preferred platforms. Some farmers indicated that their partners manage this part of the business and have greater digital literacy. Email and text were the most preferred social media platforms for general use. The 'other' category was next preferred. This indicates that there is a greater diversity of digital media used personally than there was for business.

Most respondents considered themselves to be passive users of digital media, usually only reading the material received. Only 22% actively posted material or contributed to online discussions.

AgKI E-News was strongly supported, reiterating the preference for email communication. Sixty-four per cent of respondents gave the E-News a top ranking and it received an overall score of 4.3 out of five. And the Kangaroo Island Agricultural Trials booklet also received praise – but you know this publication's worth as you are currently reading it!

The AgKI Facebook page received less praise. This was predominantly due to most respondents not using Facebook, or being unaware that the page exists.

Take Home Messages

- Email is the most preferred social media platform for business and personal use.
- AgKI E-News was viewed as a valuable news source which can only be accessed by AgKI members. If you are not a member of AGKI, sign up today to start receiving the monthly e-news.
- If you are on Facebook, follow the AgKI page for updates about agricultural news and events on the Island.

Funding/Sponsors

- **AGKI through the Australian Government National Landcare Program Smart Farms Small Grants**

Further Information

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Ag Tools & Tech Demonstration Sites

Background

The use of technology in agriculture is rapidly advancing, but sometimes it's hard to keep up with the advances. It's always nice to be able to physically touch and see the items and learn from other farmers how useful they are and any pitfalls. For this reason, Agriculture KI sought funding to set up four local demonstration sites.

Site 1 – Farm Water Monitoring (S & M Veitch)

Simon and Marisa Veitch set up a remote water monitoring system to detect leaks on the header tank and measure salt levels. The data is accessible online 24/7 or via a daily SMS. Simon's original estimate that the system install would pay for itself within two years through saved labour costs is proving to be correct. The leak detection unit has proven its value, detecting a leaking trough. This saved a tank of water and prevented the loss of stock condition, as the trough was only being checked every 3 days. Since installing the system, Simon has learned that the placement of sensors and filter size is critical to ensure blockages don't occur if using dam water. Refer to the Kangaroo Island Agriculture Trials 2021 Results booklet for the full story.

Site 2 – Moveable Moisture Probe (S Childs)

Two AquaCheck probes with MEA data logger were installed in a potato crop on Steven Childs' farm. The probes showed the soil moisture trends at different depths, particularly at depths that cannot be easily dug by hand. The data gave early warning of drying soil and helped determine when or if to start watering again after the early rains in February. Refer to the Kangaroo Island Agriculture Trials 2021 Results booklet for the full story.

Site 3 – Auto Draft & Walk Over Weighing (Tru-Test) (W & J Stanton)

The ability to weigh, analyse and manage your livestock from wherever they are is a game changer in taking the guesswork out of decisions. The remote Walk Over Weigh platform and Datamars Livestock software, Tru-Test, enables exactly that without a person in sight. The system can be used to:

- track animals against target weights or a range of other data
- monitor weights individually or by groups
- filter the data to identify top and bottom performers
- set up draft lists and show up-to-date draft numbers
- instantly share the latest data with third parties
- monitor livestock or even trough water level with images from the remote camera.

Will and Jenny Stanton set up the system in 2021 and have so far found it to work well with two different classes of cattle. The unit was used to track the daily weight gain of weaner cattle, from 270kg to their 400kg sale weight. Regular monitoring gave rise to the detection of cattle that were doing poorly so they could be removed or sold early. Data were also used to determine the appropriate markets for a small number of 2-year-old steers and to check the difference between full paddock, yard and feedlot induction weights. The system is currently being used to track the condition of cows with calves at foot going into Autumn, to then work out weaning dates and supplement feeding.

The Stantons found it relatively easy to train their cattle onto the Walk Over Weigh platform. Weight loss associated with yarding animals for average daily gain capture was eliminated. The collected data is cloud based, so it may be accessed from any device. Combined with the 3-way auto draft, this allows farmers to weigh, analyse and draft off the top or poor performers without having to enter the paddock. Will and Jenny found that the capital costs of their handling facilities have been reduced because the auto draft enables them to handle only a small portion of the 500-head mob, at any given time.

Several challenges have been encountered so far. They had trouble bringing the unit into working condition, experiencing some data collection and service issues which have now been resolved. They purchased a transport kit to combat the initial lack of mobility, combined with their quick rotational grazing periods.

Will and Jenny will continue to work through these challenges because they see plenty more potential in the concept. They plan to use the auto draft to wean calves, remove poor performing second-calvers, remove bulls and catch animals that need retagging, marking or treating. The system might also be used for the identification of low maintenance cows and pedigree matching. Stay tuned for field days on-site and more results in next year's ag trials booklet.

Above: Stantons' walk-over weigh set-up.

Site 4 – DNA Trait Mapping in your Commercial Sheep Flock (M & R Willson)

Most producers are aware of the value of using ASBV when selecting rams and in a stud operation so that the full parentage of lambs is known. But how can you speed up genetic gain in a commercial flock when the progeny may come from any one of the rams put out in the mob? Neogen offers a commercially priced DNA testing program, allowing producers to test the rams' DNA. The producers can select the best weaners in the commercial flock, test their DNA and use that data to link the lamb to its sire, thus identifying the rams throwing the best progeny.

Mitch and Ros Willson have done some trial DNA work with Neogen. Tissue sampling units were used to collect a representative sample of DNA from ewe hoggets. They found the testing process quick and easy. An applicator is used to remove a small sample of tissue from the sheep's ear and hygienically transfer it into a vial.

The DNA samples were analysed to produce a 'flock profile' which described traits including clean fleece weight, micron, eye muscle depth, fat and growth. The data is used as a decision-making tool when buying rams, ensuring that they meet the Willsons' breeding objective and improve the flock.

DNA was also taken from their rams and linked to DNA from the hoggets in a 'parentage test'. They correlated the results with visual, fleece weight and micron assessments to identify the rams that were throwing the best progeny.

The results showed that the flock is genetically capable of producing a higher wool cut than they see from benchmarking data. There is an increasing demand by buyers to know what they are buying; questioning micron, fleece weights and growth rates. Genetic testing takes the guess work out of predicting what your stock will produce.

Take home messages

- New technologies can save time and money by taking the guess work out of decisions.
- There are four ag tools and tech demonstration sites on KI. Call the producers to learn more about practical application and cost effectiveness.

Funding/Sponsors

- **AGKI through the Australian Government National Landcare Program Smart Farms Small Grants**
- **S & M Veitch (Simon - 0457 137 283)**
- **M & R Willson (Mitch 0427 531 200)**
- **S Childs/DJ Growers (David 0419 849 674)**
- **W & J Stanton (Will 0429 855 922)**

Further Information

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A Checklist for Before & After Fire

FIRE PREPARATION ON A FARMING PROPERTY

This is a basic checklist only, with ideas to assist farmers to prepare for a fire. It is not a full list and is intended as additional to the guides distributed by CFS, Red Cross, Government and others. The "Fiery Women's Workshops" hosted by the CFS are another excellent resource, and there are some links to more comprehensive online resources at the end of this article.

Vegetation

- Clear up around house and sheds and ensure buildings have sufficient width & height vegetation clearance for fire fighting vehicles to safely access.
- Follow native veg clearance guidelines.
- Creek crossings need to be clear of vegetation and able to support 25Ton truck capacity.

Water supply

- Ensure manhole is easily accessible and free of vegetation to allow a hose to be dropped in to access water reserves.
- Have fittings from the outlet that are compatible with CFS fittings or adaptors.
- If you have a pump, ensure it is plumbed into the tank. Attach written durable written instructions to the pump, including fuel type and starting instructions. If possible, keep fuel near the pump, or instructions on where fuel is kept.
- Don't rely on electric pressure pumps as you may lose power. Have a generator back up.
- Ensure you have sufficient water storage at house & sheds and adequate pumps so you can quickly fill your fire fighting unit. You may not be able to access your dams.

Maps

- Have aerial farm maps to hand to farm fire units, CFS etc. Identify water supplies, gates, property boundaries, easy escape routes, safe harbour locations and where it is safe to cross creeks. Include paddock names (especially for people helping to move stock).
- Have reflective signs with an arrow to indicate water points.

Livestock

- Have a plan for where to move stock for all directions of an approaching fire front.
- Ensure you have suitable yarding for stock and in an area that is defendable e.g. not surrounded by trees and scrub. Create a buffer zone (plough or burnt break).
- Consider splitting up large yards to enable more stock to be held, or consider the use of portable yards.
- Prepare a grab sheet for stock compatibility (i.e. which mobs can be boxed up) and include a map of yards so others can muster and record where stock have been placed.
- Once stock are mustered leave all paddock gates open for easier access.

Infrastructure/fences

- Woolsheds usually burn after the fire front has passed. Stop embers from blowing in under the woolshed by tech screwing or using droppers to hold sheets of iron around the base of the shed.
- Be prepared to have a generator to supply all electrical needs for several weeks.
- Spray along fence lines in early spring (aim for bare earth). Check your fences at the same time. If not against scrub, this will protect your fences and many will be salvageable with droppers, ensuring stock proof paddocks to return stock to.

What to pack/prepare for

- Expect to lose phone and internet reception – UHF radios are useful. Have extras available and a consistent channel that you talk over.
- Be able to charge phone and laptop in the car, and have extra reading glasses on hand if necessary.
- Have a list of contact numbers, including neighbours and CFS.

- Ensure protective clothing, mask, goggles and boots are available.

Current Bushfire Ready Plan for Evacuation or Staying

- Have a checklist of what to take. Itemise a list per room (as it may not be you doing the packing). Have a plan of how and where to take things.
- Pack an overnight bag and keep it somewhere accessible.
- Prepare a fire safe bag to transport important documents. Make multiple copies of documents and store in different places.

Insurance

- Understand your policy. What is covered? Have a realistic replacement value.
- Ensure your policy provides funds for clean up and business continuance.
- Reassess valuations each year. Sit down with your agent and go through each item in the policy.
- Take photos of valuable furniture, jewellery and other expensive items you have in your home.

POST FIRE RECOVERY CHECKLIST

The emotional toll of a disaster can't be under-estimated. A checklist of steps to take towards recovery can help you to focus and move forward.

Urgent Response: Days 1-7

- Check fire – make sure fire/spot fires are blacked out – monitor regularly.
- Identify and isolate on-farm hazards – report as necessary.
- Injured livestock – contact PIRSA, your vet & neighbours to assess & euthanise livestock (do not do this by yourself if possible). Ideally put sheep in portable yards to do this. Ask for help. PIRSA can provide a burnt sheep assessment guide.
- Start salvaging any contents if safe to do so. Be aware of unstable structures and asbestos.
- Assess paddocks – pick & secure good paddocks first to put livestock in, then look at boundary fences.
- Ensure livestock have access to sufficient feed & water.
- Prioritise, plan, delegate: What needs to be done now? What can be done later?
- Start doing a few small, safe jobs from the plan.
- Protect your drinking water by diverting downpipes until the first rains have provided an initial flush (off roof and pipes).
- Document everything (a pain, but may be critical).
- Take plenty of photos and notes for insurance and future reference. Document everything, even by taking photos of people, business cards, situations, etc. You will be grateful later.
- Contact your insurance agent (They are going to be one of your best friends).
- Be humble enough to accept help that is offered and ask for help when needed (e.g. family, friends, contractors, agencies, army.)
- Stay connected with your community. Where possible, attend community meetings and events and visit relief hubs. This will help you to access the supports you'll need at this time.
- Set up a "telephone tree" for contact with friends and family outside the fire scar. Delegate somebody to be your key contact for letting everyone else know how you're going and what's needed.
- Remember, you are not alone. It's overwhelming but just take one step at a time.

What to focus on in the days, weeks and months after the fire. If you're unsure where to go or how to start, contact PIRSA (8553 4949) who can help direct you to appropriate supports.

RECOVERY

- Plan. Prioritise. Delegate. Allocate. You don't need to do this process alone – it's OK to ask for help.
  - Write down all tasks to be done now
  - Prioritise these tasks
  - Detail what actions are required & who can take responsibility for each action.
  - Do this daily over a cuppa with all family, helpers & team members.

- You need to change your role to facilitate, plan, plan, plan, and plan again

- Ensure the safety and wellbeing of yourself, family and friends. Keep the home front as normal as possible – regular meals, adequate sleep, good communication & responsiveness to children's needs.
- It's a no brainer to seek professional help to support the entire family as they work through the trauma. Timely support for wellbeing can prevent mental illness. Watch out for each other.
- Share the challenges and issues facing you. Remain solution focused.
- Everyone will be affected differently and have different priorities. DON'T COMPARE.
- Replace important documents that have been lost (driver's license, passport, marriage certificate).
- Identify and isolate on-farm hazards such as
  - fallen powerlines
  - asbestos contaminated sites
  - chemical storage areas
  - sheep dips and spray areas
  - lead and other heavy metal contaminated sites (batteries, treated pine etc.).
  - falling trees.
- Use the fire as an opportunity to make improvements (e.g. relocating buildings, adding raceways, upgrading machinery, discussing succession).
- Budgeting is really important to keep on track (taking into account insurance claims).
- Accept any relevant donations (fodder, fencing equipment, machinery etc.). Seek government, local council and charity support. Seek & accept advice on all matters. Record names and phone numbers.
- Keep taking photos and records for future reference.
- INSURANCE: Ring insurance agent and keep them up to date. Be respectfully assertive, make sure you know what you are entitled to on your insurance policy and be persistent. Insurance claims can take up to 12 months or more to finalise. Be aware of tax implications of insurance claim payments; talk to your accountant.

HOUSING & SHEDS

- Consider good temporary accommodation close & convenient to property.
- Organise removal of burnt sheds, housing & contents – cleaning up cost can add up so allow for this in your budgeting.
- Organise house & shed replacement. Remember, building applications with Council can take a long time.
- If you are going to build in a new location, be mindful that there may be costs associated with connecting utilities to the new site.
- Expect rebuild to take longer & cost more than you think. Be mindful of budget (it can easily blow out).

STOCK

- Manage the health and welfare of your animals:
  - Providing adequate food, water and shelter to remaining animals is a priority. Monitor closely as they can deteriorate weeks after. Assess good paddocks and start with these to secure stock.
  - Look at all normal livestock management and what areas will need to be adapted, and start looking for solutions.
  - Burnt tips of ears will eventually shrivel up and drop off but will remain sensitive. Burnt feet are a major issue if stock can't feed or drink. Hooves may fall off if burnt badly enough, but if the animal is healthy enough they should heal. Seek advice from PIRSA or vets.

PASTURES & FEED

- Do a feed budget and test grain and hay to ensure you meet stock nutritional requirements.
- If possible, de-stock burnt and partly burnt paddocks.
- Seek potential for agistment.
- Consider building a stock containment area or sacrifice paddock to limit grazing to a defined area (to protect your pastures, soil and vegetation). Heavier soil is best and with some shelter if possible.
- Perennial pastures and sub-clover are generally unaffected by fire. However, fire can have a major impact on annual pastures.

SOILS

- Consider protecting loose, sandy soils from wind erosion with cover crop of oats, deep ripping or ridging.
- Upgrade track drainage to minimize erosion.

NATIVE VEGETATION

- Cleaning up fallen trees & branches can be a daunting task. Consider the service of an arborist to identify trees that may fall on buildings and to identify the ones that will survive. Use loaders, dozers and/or an excavator to get this done (note dozers make a bigger mess and are nowhere near as efficient as an excavator). This is usually not covered under insurance.
- A significant proportion of native vegetation will survive a bushfire; give it time to recover. Ideally fence it off.
- Watch for burning tree roots three to six months after the fire.

BIOSECURITY

- Reduce weed spread from introduced fodder by feeding stock in one location, such as a containment area.
- Closely monitor areas disturbed by firefighting or recovery activities.
- Agisted stock should be monitored – keep an eye out for worms, lice, footrot etc.
- Watch out for animals straying because of damaged fencing.
- Practice good disease hygiene management and ensure good biosecurity practices when buying stock.

WATER SUPPLY

- Protect your dam water by:
  - checking all water infrastructure for damage
  - trapping ash, debris, organic matter and sediment with sediment traps or temporarily cutting gutters
  - consolidating water supplies with pumps and pipes
  - being aware that dams may require de-silting
  - removing stock if water becomes putrid, looks or smells rotten or has signs of blue green algae (paint-like scum on surface). Tests can be done (contact PIRSA).

FENCING

- Mark boundary fence alignment prior to clean-up.
- Seek assistance with clearing & grading boundary fence lines.
- Avoid replacing internal fencing immediately; fire offers an opportunity to re-think your farm layout.
- Consider:
  - getting an aerial photo of your farm to review your farm layout. Seek advice on whole farm layout.
  - patching up old fences wherever possible
  - a new fence alignment and gate location(s)
  - replacing fencing along land class boundaries
  - consider using portable sheep yards.
- BlazeAid & other help may be available, as well as fencing contractors. Be organized in ordering fencing material so it is on hand & ready for fencing crew. Think about alternative fencing options (e.g. patching with droppers, vermin proof fencing).

Acknowledgements

- **Agriculture Victoria**
- **Tom Silcock**
- **Tracie Heinrich**
- **Ros Willson**

Further Information

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(Lyn can provide a resource contact list in addition to advice and support.)

Carbon Farming: 3 Simple Concepts

There is a lot to know about carbon if you're a land manager, but understanding the difference between these three basic concepts will be a good start.

1. On farm carbon management

This is about continuing, building on and adopting farming practices to increase the amount of carbon captured across your property. Increasing carbon in your soil improves soil health which is good for productivity and good for the environment. Building soil carbon is not a new idea; it is a core principle in a range of other land management practices aimed at increasing productivity, while improving your land for future generations.

You don't need to generate or sell carbon credits for carbon farming to be profitable. On farm carbon management is profitable as a discrete activity through improvements to natural capital, increased productivity, improved soil nutrient retention, reduced inputs and better drought resistance.

2. Carbon-neutral farming

Carbon-neutral farming involves strong on farm carbon management, with an intentional monitoring component aimed at providing evidence to demonstrate that your farm runs as a carbon-neutral industry. Jigsaw farms in Victoria is a great applied example of what this looks like.

As in on farm carbon management, land management practices can be used to increase the amount of carbon stored in soil and vegetation (sequestration) or to reduce greenhouse gas emissions (abatement).

Get sequestration and abatement practices working and you are on track to a carbon-neutral farm. Carbon sequestration for landholders is the process of removing carbon from the atmosphere and capturing it in the soil or trees.

Sequestration projects include:

- replanting native forest
- farm and plantation forestry
- improving soil management to increase plant biomass and reduce soil disturbance.

Emissions reduction projects include:

- reducing methane emissions from livestock
- reducing fertiliser emissions
- manure management.

A carbon-neutral farm reaps productivity and environmental benefits, as well as the profit that accrues when consumers preference products from carbon-neutral suppliers.

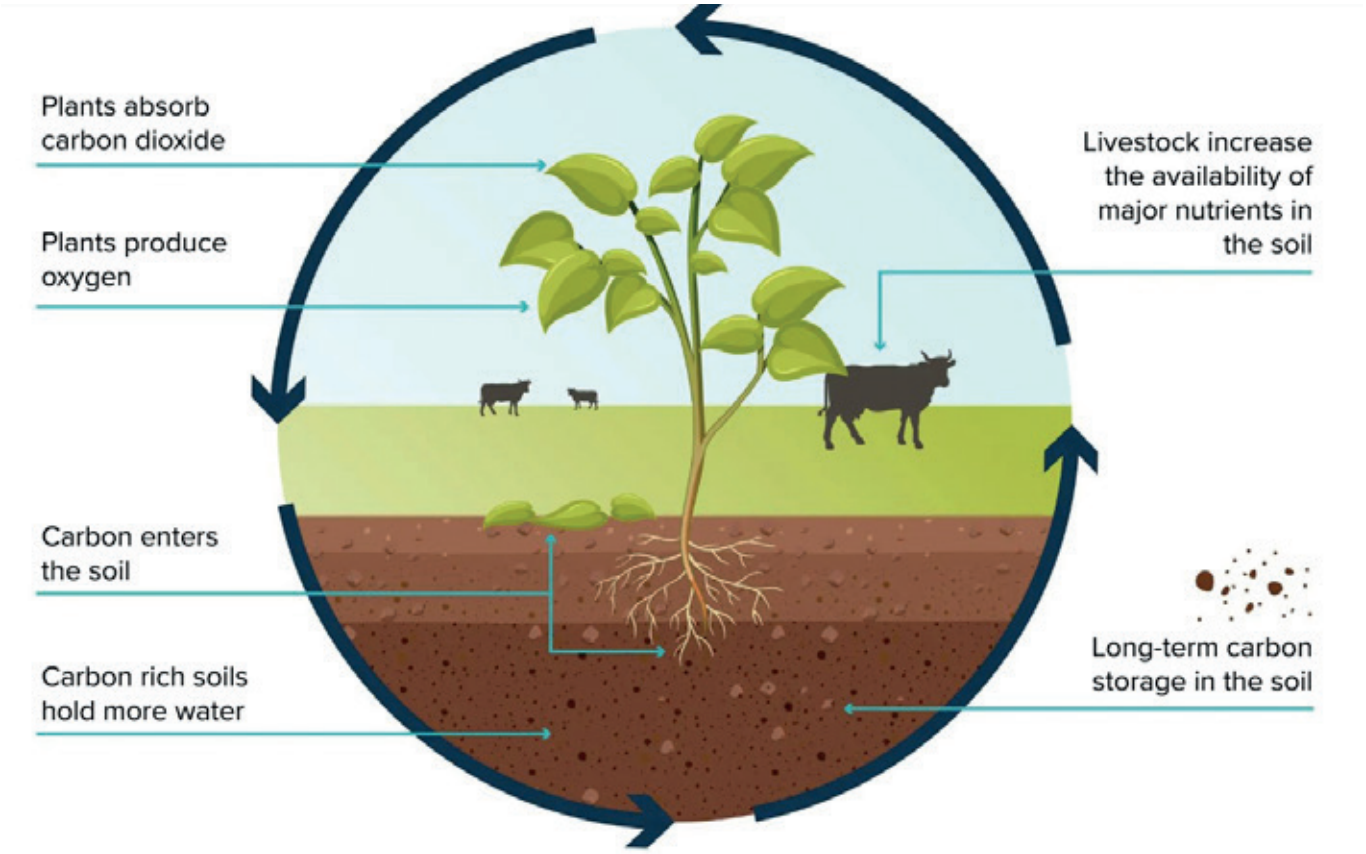
Demonstrating carbon-neutrality is a complex, yet achievable beast. The Kangaroo Island Landscape Board and PIRSA are good first contacts to find out more. Each farm with a carbon-neutral balance sheet also helps to reduce the climate impact of farming more generally and help meet greenhouse gas reduction targets.

3. Generating and selling carbon credits

It is critical to know that you can deliver great on farm carbon management and be a carbon-neutral farmer, without participating in the carbon market. Depending on your enterprise, you may be in a position to run a project that generates Australian carbon credit units (ACCUs or carbon credits) by following specific carbon farming methodologies that reduce emissions or store carbon.

Each carbon credit represents one tonne of carbon dioxide equivalent greenhouse gas emissions stored or avoided. You can sell carbon credits but keep in mind that sold carbon credits can't be counted in your farm's carbon-neutrality balance sheet.

For information about participating in the carbon market make your first stop the Australian Government's Clean Energy Regulator, an independent statutory authority responsible for administering legislation to reduce carbon emissions and increase the use of clean energy.



More information

While not experts, staff within the Kangaroo Island Landscape Board and local PIRSA office are here to help navigate this new space. Feel free to get in contact if you have specific questions or project ideas that you'd like to explore.

The Limestone Coast Landscape Board Carbon Explainer video YouTube series includes animated videos about the carbon cycle, and carbon sequestration and emissions reduction, as well as videos featuring local farmers talking about the importance of soil and becoming a carbon-smart land manager.

Information about carbon farming including benefits and opportunities, is available on the PIRSA website.

The Australian Government's Clean Energy Regulator website is a good, independent source of information. The Clean Energy Regulator administers schemes legislated by the Australian Government for measuring, managing, reducing or offsetting Australia's carbon emissions.

Further Information

KI Landscape Board

P 8553 4444

PIRSA Kingscote

P 8553 4949

Limestone Coast Landscape Board Carbon Explainer video series

Australian Government's Clean Energy Regulator

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Not If, When! Emergency Animal Diseases

Are you prepared for an Emergency Animal Disease outbreak?

Emergency Animal Diseases (EAD) are predominantly exotic animal diseases that can cause devastating impacts to the livestock industry with serious economic and social implications. An outbreak could result in animal deaths, production losses and trade restrictions.

Australia is fortunate to be free of most of the serious diseases that have devastating effects on animals in other parts of the world, but we must not be complacent. The threat to our agriculture industry is rising as we live in a highly interconnected world with increasing international trade (including access to online products via international mail) and a return to international travel now the COVID-19 restrictions are lifting.

International trade in livestock and products could be shut down immediately if there is a detection of one of these exotic diseases (such as Foot and Mouth Disease). Trade would not resume until Australia could prove that the disease had been eradicated.

With very recent cases of EADs such as Lumpy Skin Disease (LSD) and Foot and Mouth Disease (FMD) on Australia's doorstep in Indonesia, all producers should be alert for these livestock diseases across Australia and practicing a high standard of farm biosecurity.

EAD THREATS TO BE AWARE OF:

Foot & Mouth Disease (FMD) in cloven-hoofed animals (including cattle, sheep, goats & pigs)

FMD is not present in Australia but is endemic throughout the Middle East, Africa, Asia and most of South America. FMD is a highly contagious viral disease of livestock causing fever followed by the development of vesicles (blisters) chiefly in the mouth and on the feet.

FMD is generally not lethal to adult animals, but it can kill young animals and cause serious production losses.

The most significant risk of entry of FMD into Australia is through illegal entry of meat and dairy products infected with the FMD virus and subsequent illegal feeding of these products (swill) to pigs.

Most countries would ban Australia's livestock and livestock products as soon as FMD was detected here.

It is unlikely these restrictions would be lifted until Australia could prove the disease had been eradicated.

Lumpy Skin Disease (LSD) in cattle

LSD is a devastating disease of cattle and buffalo caused by a capripox virus. This disease has never been recorded in Australia but is spreading rapidly internationally including throughout our close neighbours Thailand, Malaysia and Indonesia. It is spread by biting flies and mosquitoes, midges and possibly ticks.

With the heightened awareness internationally of LSD, it is important that Australia, with its large dairy and beef export markets, is able to confidently and credibly demonstrate on-going freedom from this disease.

African Swine Fever (ASF) in Pigs

Australia is free of ASF but there is an increasing threat as the disease is closer than ever to Australian borders. It continues to spread worldwide, threatening pig health and welfare. The disease has reached multiple countries across Asia, the Caribbean, Europe, and the Pacific, including Indonesia, Philippines, Timor Leste and Papua New Guinea, affecting both domestic and wild pigs. Australia is working closely with counterparts in Timor Leste, Indonesia and Papua New Guinea to assess the situation and provide assistance.

ASF is a highly contagious viral disease of domestic and wild pigs, in which the mortality rate can reach 100%. There is currently no effective vaccine against ASF.

Current outbreak of Japanese encephalitis (JE) in Australia

Detections of JE in South Australian commercial piggeries in February 2022 followed confirmation of the virus in piggeries in Queensland, New South Wales and Victoria.

JE is not a food safety concern and commercially produced pork meat or products are safe to consume.

JE is a mosquito-borne disease with animals and people becoming infected through mosquito bites. The natural lifecycle of JE is between waterbirds and mosquitoes, but may spill over to pigs and horses. While rare, humans can also be infected through mosquito bites. People and horses are considered 'dead-end' hosts as once infected they do not play a role in transmitting the disease further. Pigs can reinfect mosquitoes, therefore amplifying the disease.

In pigs the most common clinical signs of JE are mummified and stillborn or weak piglets, some with neurological signs. In horses, most animals infected do not show symptoms, with a small number developing neurological signs.

JE virus is a nationally notifiable disease. PIRSA is working closely with SA Health, local industry, and with interstate counterparts, and has established an incident management team with staff on the ground to conduct surveillance activities and to provide information and advice to farmers.

Preparedness is key

The Emergency Animal Disease Response Agreement (EADRA) is a unique contractual arrangement signed in 2002 that brings together the Australian, state and territory governments and livestock industry groups to collectively and significantly increase Australia's capacity to prepare for and respond to EAD incursions.

For all diseases listed in the EADRA, there is a pre-planned and documented approach to how an outbreak is managed. These preferred approaches have been developed and agreed upon by governments and relevant industries and are captured in the Australian Veterinary Emergency Plan (AUSVETPLAN) disease strategies and response policy briefs.

AUSVETPLAN is a comprehensive series of manuals that sets out the various roles, responsibilities and policy guidelines for agencies and organisations involved in the response to the disease outbreak.

Further Information

National Pest & Disease outbreaks in Australia: www.outbreak.gov.au

Farm Biosecurity website, surviving an EAD outbreak: www.farmbiosecurity.com.au

AUSVETPLAN: animalhealthaustralia.com.au/ausvetplan

One Biosecurity: onebiosecurity.pir.sa.gov.au

The AUSVETPLAN documents are available on the Animal Health Australia website.

Early detection of an EAD is paramount to stopping a disease spreading rapidly across regions. Report any suspicions of disease to the EAD Watch hotline on 1800 675 888 **immediately** so it can be determined if it is a significant or notifiable disease. This number will put you in touch with a PIRSA officer who can discuss the situation. It is always better to err on the side of caution and make the phone call.

Refer to 'NLIS campaign on KI' article on page 21 for how and why traceability of livestock is so important.

Actions you can do now:

- Don't feed meat or food waste that has come in contact with meat to pigs or ruminants. This type of food waste may contain EAD viruses.
- Report unusual animal disease signs to your local livestock veterinarian or Animal Health officer or phone the EAD Watch hotline on 1800 675 888. There are funds available for disease testing if required.
- Keep livestock records up to date, including your NLIS database and movements on and off your property.
- Have a Farm Biosecurity Plan. You can develop your own biosecurity plans through the One Biosecurity online portal. Include an EAD outbreak plan with consideration of stock feed supplies. Do you have extra feed if there is a national livestock standstill? Also consider visitor management.
- Be aware of your threats. Know what these diseases look like so you can recognise the signs and report concerns.

Emergency Animal Disease Watch Hotline:1800 675 888

Take home messages

- EARLY detection of an EAD is paramount to reducing spread and therefore reducing the impact
- Preparedness is key; implement good biosecurity measures
- Traceability is so important; the faster the disease can be contained, the less destructive the outbreak can be, and the quicker life can go back to normal.

Better your business

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Training programs/workshops

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mla EDGE NETWORK
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mla.com.au/edgenetwork

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mla.com.au/bredwellfedwell

Profitable Grazing Systems
mla.com.au/pgs

Producer Demonstration Site
mla.com.au/pds

beefup FORUM
mla.com.au/beefup

meatup FORUM
mla.com.au/meatup

MLA resource hubs

MLA has compiled this series of hubs containing relevant resources on a range of on-farm topics:

- **Livestock:** Genetics, beef, sheep, goats
- **Feedbase:** Healthy soils, phosphorus, leucaena, pasture dieback, dung beetles
- **Sustainability:** Carbon neutral by 2030, dung beetles
- **Climate:** Climate, disaster recovery
- **Other resources:** Seasonal resources, COVID-19 resources and market insights hub, mental health, MLA's e-newsletters

mla.com.au/hubs

The toolbox

Self-guided online tools and training packages to upskill anytime, anywhere. Topics include:

- assessing nodulation in legume pastures
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- pain relief use in southern cattle
- pain relief use in sheep
- introduction to MateSel
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- visual indicators of soil condition

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elearning.mla.com.au

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- ***Feedback* podcast:** mla.com.au/feedback-podcast
- ***On the ground* podcast:** mla.com.au/on-the-ground
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Update: Sheep Blow Fly Eradication on KI

Background

Sheep Blow Fly (SBF) causes significant economic losses for Australian livestock producers. Management costs and losses of flystrike in sheep in SA are around 60 million dollars per year. South Australia Research and Development Institute (SARDI) researchers are developing the Sterile Insect Technique (SIT) for Sheep Blow Fly and will develop this technique on Kangaroo Island. SIT aims to provide an alternative solution to combat the often-fatal condition (if left untreated) and improve animal welfare while lowering these management costs.

Though you might not have seen much happening and we have experienced some delays, the project is advancing, so we provide a little update here.

What's being done

The rearing facility will most likely be installed in spring 2022 at the Kingscote resource recovery centre (corner of North-Coast and Ten Tree Lagoon Road). This site, close to the Kingscote airport, will allow for a smooth production and aerial release of flies across the island. The modular and mobile facility is designed to produce the millions of sterile flies required for the intended eradication of Sheep Blowfly from KI over the next four years. The release of flies will always be in late winter to early spring when the blowfly maggots overwintering in the soil become active.

The production of sterile male blowflies will be scaled up over the coming two years, aiming to reach 50 million flies per week. The recently appointed facility manager Helen Brodie is eager to start this all as soon as possible as the upscaling will require extensive testing and optimisation of the workflow in the facility.

In spring 2022 we will start doing the first small scale experimental releases of sterile flies on KI. This will include the installation of traps for blowfly surveillance and releases of marked sterile flies in several spots on the island. These releases and trapping will inform us on the viability of the released flies (how long do they live; how far do they move) and the activity of 'wild flies'. These experiments are essential to determine the methodology for the much larger scale releases starting in 2023. We aim to collaborate with different organisations on KI (AgKI, Vets, farmers) to collect data on flystrike, flystrike management and blowflies over the whole duration of the project.

Kangaroo Island is only the beginning of using SIT against Sheep Blowfly. Once this project is successful, the KI facility will have provided invaluable data on fly ecology and methodology for future use of SIT as a method of preventing flystrike on the SA mainland.

Funding/Sponsors

- **This project is part of the Local Economic Recovery Program, a partnership project with the Kangaroo Island community and Primary Industries and Regions (PIRSA). It is jointly funded by the South Australian and Commonwealth Governments under the Disaster Recovery Funding Arrangements, and administered through the University of Adelaide/SARDI Affiliate Agreement. Industry funding will allow the roll-out of SIT on KI over the coming years.**

Further Information

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Update: Footrot

The SA Footrot Management Program is funded by the Sheep Industry Fund Board of Livestock SA.

The program's core focus is to reduce animal welfare issues and economic impact, to reduce the prevalence of footrot in South Australia and to assist sheep producers in controlling and managing footrot on their properties.

Where to get help

Footrot including benign footrot (sometimes referred to as "scald") is a notifiable disease. Any lameness associated with the hooves of sheep, where footrot cannot be ruled out as the cause of lameness, *must* be reported to PIRSA Animal Health staff for investigation. Getting the correct diagnosis and management advice is crucial for minimising the impact to your business and reducing the spread of the disease. PIRSA staff can assist with developing an individual property disease management plan and can provide a list of accredited footrot contractors or vets that can assist with treatment and eradication.

Recent footrot seasons

Spring 2021 on Kangaroo Island saw above average rainfall which provided the ideal conditions for the spread and development of footrot in sheep.

While there has been an increase in the number of producers embarking on eradication programs, the 2019-20 Black Summer bushfires led to increased footrot detections, resulting from straying sheep during the fires and post fire restocking efforts.

Impacted producers have worked hard to eradicate the disease, with 11 farms completing their footrot eradication programs with a successful clearance inspection in spring 2021. Congratulations to them all.

Four producers have decided to destock to eradicate the disease, while there were eight new detections in the 2021-22 footrot spread period.

Farm biosecurity

Prevention is always better than cure. Please remember to have good farm biosecurity measures in place on your farm to reduce footrot being brought on to your property or spreading it to others.

Measures to help minimise the risk of footrot entering your property include:

- doing your research before purchasing stock by asking vendors for the footrot history and if they routinely footbath
- checking National Sheep Health Declarations
- getting an independent hoof inspection on sheep before you purchase them
- breeding your own replacements or purchasing from flocks that have been independently assessed free of footrot
- having sound boundary fencing: double, electric or scrub barriers
- not putting lambing ewes or weaned lambs on your boundary paddocks as lambs are more likely to cross boundaries and therefore pick up or spread footrot
- separating newly purchased stock from other sheep and monitoring for signs of disease.

Further Information

Footrot information on PIRSA website

SheepConnect Footrot Field Guide (a hard copy can also be obtained from Kate Buck at PIRSA)

Kate Buck, Animal Health Adviser, PIRSA

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Update: Ovine Johne's Disease (OJD)

PIRSA administers the South Australian Ovine Johne's Disease (OJD) Management Program which is supported and funded by the SA Sheep Industry Fund Board. The program aims to reduce the economic impact of OJD in sheep by:

- encouraging producers to voluntarily investigate and manage OJD in their flocks
- encouraging the declaration of OJD disease risk is made for all sheep sold or entering SA through use of the National Sheep Health Declaration
- increasing industry awareness through education of OJD risks and the management of those risks
- promoting low-risk trading and management practices
- promoting the use of Gudair vaccine as a disease management tool.

Key points of the state OJD program that producers should note:

- Testing for OJD is voluntary.
- Movement restrictions relating to OJD for sheep entering SA are no longer in place. To minimise the risk these animals may pose it is recommended that all sheep entering SA should be vaccinated for OJD, either before entry or on arrival in SA.
- Completed National Vendor Declarations (NVD) and National Sheep Health Declarations (NSHD) remain mandatory for all sheep entering and moving within SA.
- OJD remains a notifiable disease and must be immediately reported to PIRSA Animal Health.
- Without movement restrictions there is increased ability for producers with OJD-infected flocks to trade sheep. Producers need to check the status of animals **BEFORE** purchasing - check the NVD and NSHD and ask questions. Be aware that properties with OJD infection *do not* need to declare this on their NVD. If you do not understand the OJD risk, seek advice from PIRSA or your local Veterinarian before purchasing animals.
- Neighbour notifications and tracing no longer occur.

Purchasing low risk stock

Other than vaccination and monitoring for disease, producers can rely on biosecurity and farm management practices to protect the farm business. This includes minimising the risk of entry of OJD to your property through straying livestock and risk assessment of any introductions. Further information on the possible risk of introducing sheep is provided in the table below. This table is not comprehensive but gives examples of some of the considerations when undertaking a risk assessment. You should aim to introduce sheep of the same risk level or better than your property.

Risk Assessment for Introducing sheep to your property

VERY LOW RISK of being affected with disease	LOW RISK of being affected with disease	HIGHER RISK of being affected with disease
SheepMAP accredited: faecal tested negative. The longer the property has been in the assurance program the lower the risk.	Low rainfall area – if homebred. Most Regional Biosecurity Areas are in low rainfall areas.	High rainfall area (unvaccinated)
	Abattoir surveillance – negative for Abattoir 150 or 500	Known infected or not tested (unvaccinated)
	Approved vaccinates and approved vaccinate flocks. The longer vaccination has been undertaken the lower the risk.	
	On-farm testing of animals with wasting or mortality.	

Sheep Market Assurance Program - SheepMAP

The Sheep Market Assurance Program (SheepMAP) is part of the National Johne's Disease Control Program. Producers can purchase sheep from flocks participating in the SheepMAP program as these flocks have been objectively assessed as having low risk of being infected with Johne's disease. Flocks in SheepMAP are not accredited as free of OJD, but they have a low risk of being infected compared to non-assessed flocks.

SheepMAP is voluntary and the costs are borne by the participating flock owners.

How to manage OJD risks after detection

A Property Disease Management Plan (PDMP) can be individually developed for each property to assist producers to manage their OJD risks.

Animal Health Officers work with producers and/or private veterinarians to develop pathways to lower the impact of the disease and help achieve a low-risk status. Depending on best practice related to individual production symptoms, the PDMP may include recommendations regarding:

- Livestock management:
  - vaccination with Gudair, with the plan to reach the entire flock consisting of approved vaccinates
  - accelerated culling of high-risk mobs (animals showing clinical signs, older sheep and unvaccinated animals)
  - purchased sheep should preferentially be approved vaccinates, otherwise introduced sheep should ideally be vaccinated on arrival to the property
  - separating high and low risk animals i.e., non-approved vaccinates vs. approved vaccinates
  - maintain mobs in year of birth
  - maintain a strategic and effective worm control program.
- Strategic paddock management:
  - strategic destocking of paddocks (for two full summers)
  - utilise paddocks with crop rotation whenever possible
  - fence off wet and shady areas as these environments can prolong the OJD bacterium survival or if this land is required, then graze with terminal lambs going to slaughter
  - grazing with low-risk animals i.e., terminal lambs, steers, or adult cattle.

Keep Vaccinating

Vaccinating retained sheep with Gudair is highly recommended in high rainfall climates such as KI. This is especially important given the history of the disease on KI and the fact that many replacement sheep from the mainland have been introduced since the fires. Many sheep without a known OJD status have been introduced, some from areas interstate with a high prevalence of disease.

Vaccinating does not eradicate the disease and the bacterium can stay in the soil for many months, so if vaccinating discontinues clinical signs are likely to increase.

Vaccination can be complemented with sound biosecurity practises. The new One Biosecurity program provides a framework for risk-based trading. It also places biosecurity as a key factor for decision making in your livestock enterprise. All sheep and cattle producers in SA can register on the One Biosecurity web portal.

Take home messages

- Buyer beware: if purchasing stock consider what risks you're comfortable with
- Keep vaccinating.

Further Information

One Biosecurity

SA OJD management program on PIRSA website

National OJD website, ojd.com.au

Animal Health Australia: Sheepmap

Kate Buck, Animal Health Adviser, PIRSA

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National Livestock Identification System on KI

What is the purpose of the NLIS?

The NLIS is Australia's nation-wide system for identifying and tracing cattle, sheep and goats. It is primarily designed to assist in the animal tracing process in the event of an outbreak of emergency animal diseases (EAD).

With cases of EADs such as Lumpy Skin Disease (LSD) and Foot and Mouth Disease (FMD) now on Australia's doorstep in Indonesia, vigilance against and awareness of these livestock diseases is now high across Australia.

Should detections of such diseases occur in Australia, it would have serious ramifications for our livestock and animal products exports. Our export markets for livestock products require that Australia can rapidly trace livestock movements in the event of an EAD outbreak.

The NLIS campaign on KI

In the aftermath of the 2019-20 Black Summer bushfires and to ensure the integrity of Kangaroo Island's livestock biosecurity, PIRSA Animal Health has conducted a two-year NLIS awareness campaign on the island involving:

- contacting livestock producers to remind them of the requirement to complete the NLIS database transfers
- offering to assist producers with NLIS transfers
- initiating an interactive series of workshops on the NLIS in Penneshaw, Kingscote and Parndana in May 2021
- ongoing monitoring of stock movement from Cape Jervis onto the island including documentation checks
- visiting local livestock carriers to ensure they were aware of their obligations when transporting livestock
- a second round of NLIS workshops in Kingscote and Parndana offering one to one assistance to producers
- on-going monitoring at Cape Jervis, including documentation checks.

Your obligations

Through this work, Animal Health staff have become aware of a common misconception among producers that stock agents complete their NLIS database movements for them.

It is the responsibility of the receiver of the stock to check and ensure that database movements are completed. Do not assume your stock agent will complete database transfers for you.

When stock are being moved from the mainland to Kangaroo Island properties owned by the same producer or business, owners are also reminded they still require corresponding NLIS database movements.

Further Information

For assistance, contact PIRSA's Kingscote Office on 08 8553 4949.

NLIS website

Precision Lambing Case Study

Background

Ewe mortality and lamb survival are significant factors affecting the profitability of a sheep flock.

Historically, management regimes have allowed ram exposure to occur for at least 30 days and more commonly between 42 to 70 days, even though most of the flock has most likely conceived within 30 days or less. In the precision lambing system, ewes are exposed to rams for short intervals, generally between 12-17 days to allow only a portion of the flock to conceive at a time. Rams are removed and then reintroduced after a short period of between 20-25 days for another joining period of between 12-17 days to form the second group. The ewes are then lambed down in smaller mobs, according to their lambing date and scanning results. Dedicated lambing paddocks are selected based on shelter and feed availability

What was done

Tim May, in consultation with Darren Gordon (Livestock Logic), has adopted precision lambing practices on his KI property, 'Valley View' and has increased his overall lambing percentage.

The main practices Tim adopted include:

- Short strategic joining (average of 3 weeks)
- Ensuring ewes are in condition score 3 pre joining
- Reduced mob size – twin ewes were lambed in mobs of 100 at 8 ewes per ha
- Matching ewes' nutritional requirements with feed on offer (ie 1700 kg for twins)
- Ensuring good pasture growth through delayed grazing plus the application of urea and pro-gibb
- Dedicated lambing paddocks (with good shelter)

On the 15th Jan 2021, Tim joined 1277 ewes for 24 days. The rams were removed for 6 weeks and then put back out with the mob for a further 29 days. On the 19th March all ewes were scanned and those in lamb removed from the mob. The remaining ewes were scanned again on the 1st May. The ewes were placed into mobs according to lambing date and scanning results.

At scanning all ewes were conditioned scored and the lighter (condition score <3) twin bearing ewes were separated. The remaining ewes went into confinement feeding to ensure good pasture growth in the selected lambing paddocks. Ewes were fed 350g/hd/day of oats plus pasture hay (to maintain weight) with the lighter twins receiving 550g/hd/day plus pasture hay.

The twin lambing paddocks were spread with 56kg/ha of urea on the 23rd May as well as pro-gibb to boost pasture growth.

Results

In the first cycle 842 (66%) were in lamb, with a further 396 (31%) in lamb at the second scan. 39 or 3% of ewes were dry.

Five paddocks were subdivided using electric fencing to create 5-12ha paddocks. Refer to Table 1, paddock costs. Tim estimates it took him about 1 day to set up and 1 day to remove the electric fencing.

Activity	Total Cost
Urea spreading on 68ha	$3008
Pro Gibb, Awaken ST and insecticide on 68ha	$687.48
Electric fence (energiser, posts, reels and wire) for 5 paddocks	$7125
Extra feed on lighter twin ewes from scanning until lambing (200 ewes)	$792

Table 1: Paddock Costs

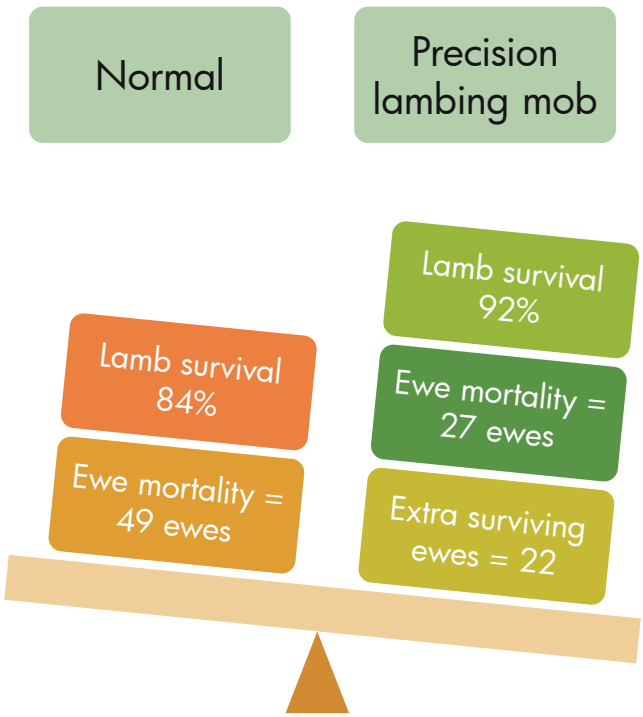
This system, whilst it requires some additional set up costs with fencing, has many clear advantages.

Tim used the farms topography to his advantage when selecting laming paddocks, selecting sheltered slopes and remnant vegetation. Once appropriate paddocks have been selected, they can then be subdivided into the required paddock sizes using temporary electric fencing.

The key is to shut up paddocks early, and feed as required with urea and pro-gibb to enable the creation of a good feed wedge. Using those paddocks with smaller mobs and tighter lambing ensured there was always sufficient food on offer for the ewes. (No late lambers lambing down onto poor feed!)

With two lamb markings, the mobs are smaller and all the lambs are roughly the same size, improving lamb survival.

The lambing results were compared to long term farm averages with a decrease in ewe mortality and an increase in lamb survival. Although there were additional costs incurred with paddock set up and scanning, overall, the system was more profitable. Refer to table 2.



Take home message

- Despite the additional costs of paddock maintenance to ensure there was optimal feed and security, extra feeding for lighter twin ewes and extra scanning, Tim increased his profit compared to running a conventional system due to the extra lamb and ewe survival rates.
- Precision lambing helps to optimise lamb survival and farm profits.

	Number	Price per lamb	Total	Total profit
Survival rate of lambs	2413			
Normal lamb survival rate	2202			
Extra lambs	211	$160	$33,817.60	
Extra ewe survival rate	22	$220	$4,831.20	
Profit of extra lamb and ewe survival			$38,648.80	
Minus costs of $10,820 and extra scanning of $348				$27,480.80

Table 2: Final Costs

Further Information

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Summer Cover Cropping on KI

Background

Cover crops are grown primarily for soil protection and enhancement, rather than as fodder or for a harvestable crop. The primary aim is to have the soil covered by a living plant for a longer period. Whilst there is anecdotal evidence of cover crops improving soil health and cash crop resilience/performance in Australian dryland cropping systems, the full value of cover crops is yet to be understood for southern dryland cropping systems. A four-year project established 20 replicated cover crop experiments across the southern cropping region from the Eyre Peninsula to Tasmania, including two sites on Kangaroo Island.

What was done

Fully replicated and randomised plots were sown using standard seeding gear at Haines (property of Pontifex Farming average 517 mm rainfall) and Stokes Bay (property of W & J Stanton average 500 mm rainfall). Both sites are typical ironstone gravel soils.

Three treatments were established:

1. Business as usual control (weed control in fallow as per current practice at the site)
2. Single species cover crop
3. Multi-species cover crop (usually incorporating the single species)

The cover crops were sown into what was a conventional summer fallow.

Prior to the establishment of the trials, the Haines site had been continuously cropped, whilst livestock are incorporated in a mixed enterprise system at Stokes Bay. Unfortunately, the Stokes Bay site was burnt by the 2020 bushfires. The resultant loss of stubble meant that attempts to establish a summer cover crop failed in that season. Pasture was established in April 2020, grazed, and terminated in October 2020 prior to successful establishment of the cover crop treatments later that month. This cover crop was terminated by heavy cattle grazing in April 2021 before establishment of the final cash crop (Kowari Oats) which was harvested in December 2021. In the summer cover crop rotation, the single species was French White Millet, and the mixed treatment consisted of Millet, Fodder Rape, Sorghum and Tillage Radish.

At the Haines site, two full seasons of summer cover crops were able to be established in the 2019-20 and 2020-21 summer seasons, with canola being the final cash crop in 2021. Millet was the single species sown in both years, whereas mixtures were Plantain, Millet, Forage Brassica, Canola, Turnip and Sunflower in 2019-20, and Sorghum, Sunflower, Plantain, Chicory, Millet and Sunn Hemp in 2020-21. The mixed species cover crops at this site were seeded by plane, with a 150m strip intentionally not spread. Inside this 150m strip, the single species millet was applied using a bait spreader. This occurred prior to harvest of the finishing cash-crop so that header chaff generated at harvest would protect the seeds and facilitate germination.

Deep soil cores were analysed for moisture, pH, mineral nitrogen, phosphorus availability and soil organic carbon, plus soil biological processes and the structure of the microbial community.

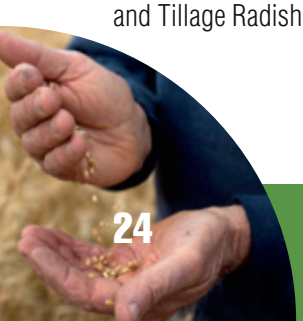
Results

Dry matter production in summer (December 2020 – April 2021) was substantially higher in the cover crop treatments than the controls, though some weed biomass was recorded at both sites (Figure 1). Cover crops produced 2-3x the amount of biomass at the Stokes Bay site than the Haines site owing to the time of sowing (October for Stokes Bay vs December for Haines). Though no differences were observed between the single- and multi-species cover crops at the Haines site, there was a ~30% increase in biomass dry matter production in the mixed-species treatment relative to the single species at Stokes Bay.

Cover crops resulted in increased yields of the following cash crops at both sites. At both sites, both the single- and mixed-species cover crop treatments yielded ~1 t/ha higher (Figure 2).

There are a number of reasons for this positive result. The cover crops provided substantial additional soil cover to protect the soil (particularly at the Stokes Bay site, which lost all previous stubble cover in 2020 bushfire) and protected the early-stage seedlings of the cash crop. Cover crops also increase below-ground inputs and activity due to their root growth, exudation of carbon, and stimulation of microbial activity.

However, growing a crop during summer potentially reduces the amount of plant available water for the following cash crop.



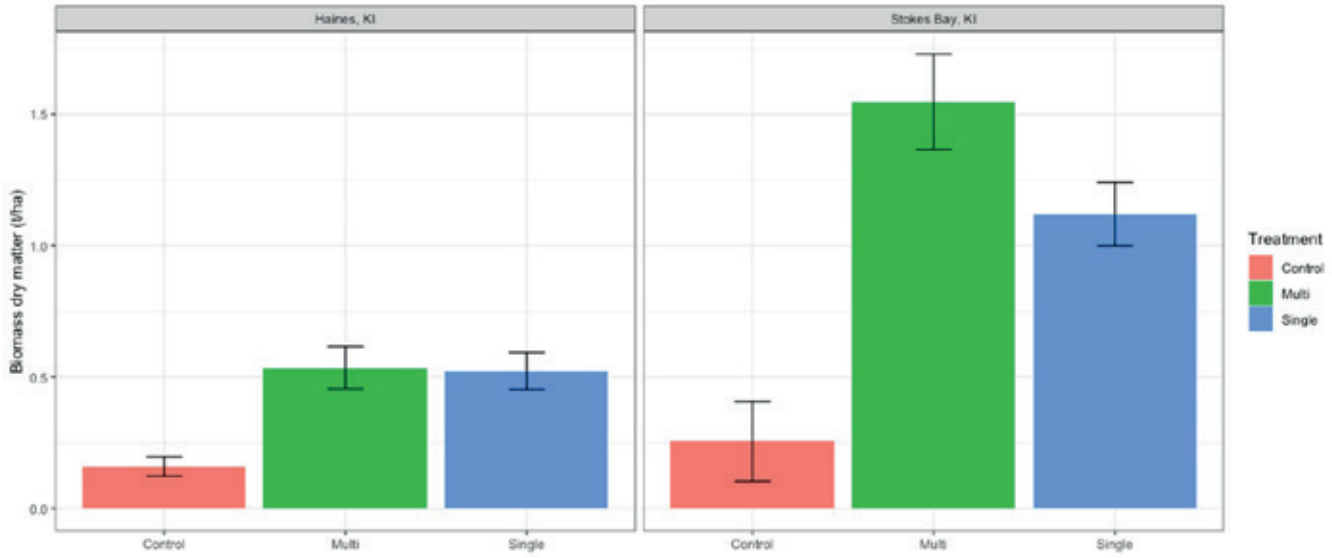


Figure 1: Cover crop dry matter production (t/ha) in the final summer season (2020-21).

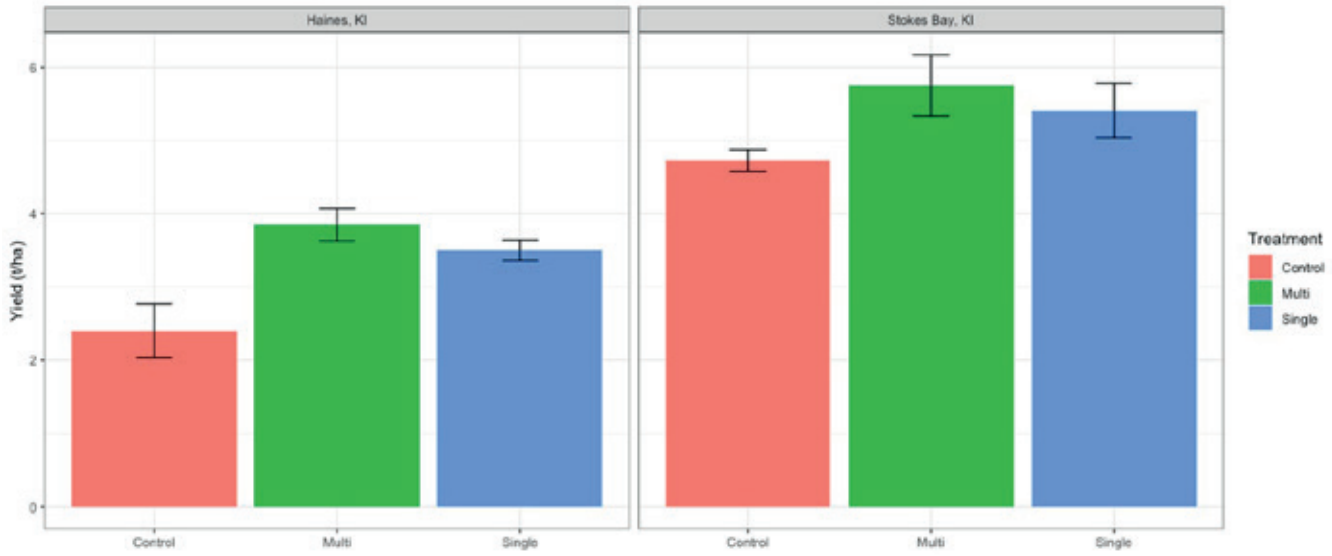


Figure 2: Yield of Canola (Haines) and Oats (Stokes Bay) from the 2021 season, following cover crop treatments. NB: Due to failure of the yield monitor on one of the headers working the Haines site, yields for several of the plots at Haines are estimates based upon yield maps from other areas where controls or single species plots were maintained beyond where soils were sampled.

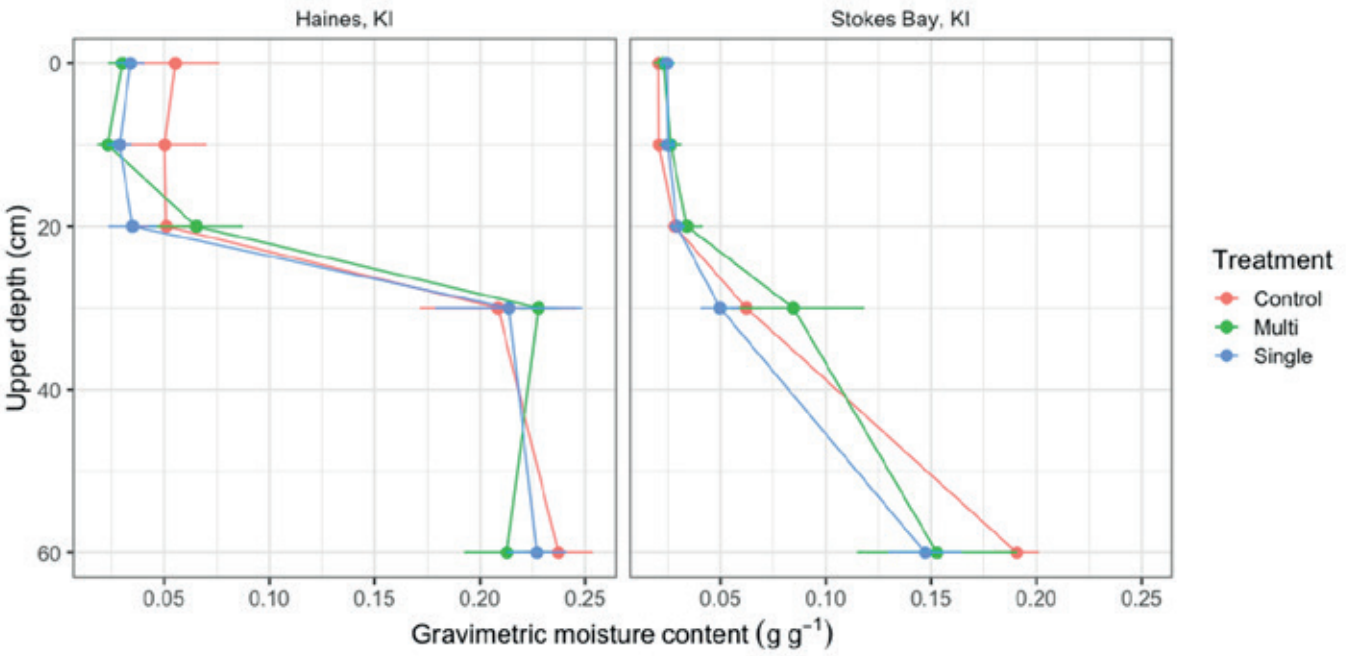


Figure 3: Moisture content down the soil profiles of the two sites.

Figure 3 shows the KI sites immediately prior to final cash crop establishment. Whilst there are slight reductions in the water content of the 0-10 and 10-20 cm depths at Haines, and in the 60-100 cm depth at Stokes Bay, this did not appear to have a negative impact on the performance of the following cash crop.

One of the most consistent observations across the 20 demonstration sites was that whilst nitrate was typically reduced under cover crops, dissolved organic nitrogen and microbial biomass nitrogen—both forms of nitrogen that typically turn over within a period of weeks to months—increase by a similar amount.

In addition to impacts (positive and negative) on soil water and nitrogen dynamics, cover crops are expected to increase soil organic carbon. This is possibly due to an increase in the amount of carbon inputted to the soil due to an effective increase in growing season, and typically being species which partition a lot more of their carbon below ground to roots and though root exudates.

Finally, we examined fungal and bacterial diversity in the surface soils of the two sites. Despite a number of biogeochemical differences resulting from the cover crops treatments, no changes in bacterial community structure were observed, and a significant treatment effect on fungal community was only found at the Haines site (Figure 7).

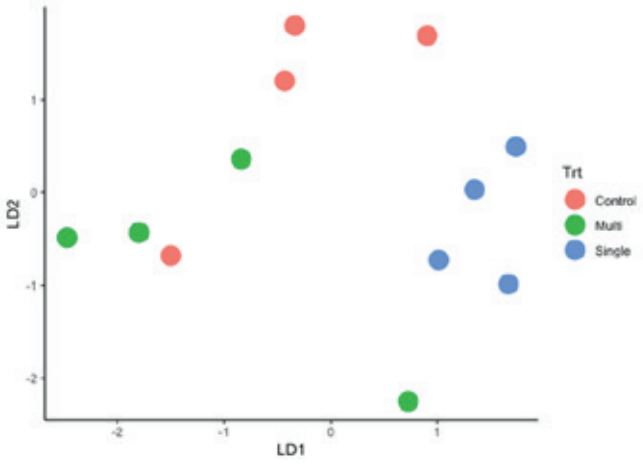


Figure 4: Fungal community structure at the Haines site on the 0-10 cm layer. No significant impact of treatment on fungal community structure at Stokes Bay, nor the bacterial community structure was observed at either site (data not shown).

Take home messages

- Cover cropping can provide soil benefits (nitrogen cycling and potentially soil carbon), even if only used sporadically to opportunistically take advantage of summer rainfall events
- Substantial yield increases were observed in the cash crop following summer cover crops—particularly as mixed species swards. Whilst difficult to pinpoint the reason, changes in both nitrogen and carbon dynamics would be positive for soil health and crop production.
- Whilst a cover crop species / species mixture may be chosen for its beneficial traits for soil processes, well managed and appropriately fertilised cash crops are also important for soil function. Thus inappropriate management of cover crops can have a negative impact on cash crop yields (e.g., by causing a moisture deficit that is not offset by winter rainfall).

Photo: Jschnable, Wikimedia Commons

Above: White Millet

Funding & Sponsorship

- **Department of Agriculture and Water Resources' National Landcare Programme Smart Farms initiative, the GRDC, and the South Australian Government (administered by Agriculture Kangaroo Island.**
- **Landholders – Pontifex Farming and Will Stanton**

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P.L.A.N.

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Nutrien Ag Solution's animal production team has been formed to assist clients drive profitability through improved livestock production.

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Dedicated contact with your specialist is on-farm and face to face – we believe this is critical to have a thorough understanding of your business. Your specialist will work with you to identify potential opportunities to improve the profitability of you business by applying technical concepts through a measurable and practical approach. The customised advice and plans are specifically targeted to your enterprise, whether it's a short-term tactical response or longer term strategic solutions.

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KI Oestrogenic Clover Project

Background

The KI Oestrogenic Clover Project aims to measure the impacts of the 2019/20 bushfires on pasture composition and upskill producer knowledge and understanding of oestrogenic clover issues. While annual clovers are an essential component for many pasture paddocks, oestrogenic clovers have a negative impact on lambing percentages.

Many pastures have been renovated in recent decades and newer non-oestrogenic clovers introduced. However there is evidence that high levels of oestrogenic clovers still exist in some island pastures. These clovers are still contributing to high number of dry ewes and reduced lambing percentages on some properties.

What was done

- Upskilling producers in clover identification and assessment of pastures, and development of pasture management strategies, through field workshops at Seddon and Duncan;
- Objective assessment of 100 paddocks in the fire scar for levels of oestrogenic clovers and subsequent laboratory analysis of samples for oestrogenicity from those paddocks;
- A sheep reproductive efficiency survey, to develop a benchmark for sheep reproductive efficiency on KI and identify potential opportunities for improvement (results will be available in next years Ag Trial booklet);
- Initial investigations into the development of herbicide tolerant non-oestrogenic sub-clover.

Field workshops

Seventeen producers participated in the field workshops, identifying the three main oestrogenic 'bad' cultivars, Dinninup (see Figure 1), Dwalganup and Yarloop, and putting their new skill into practice by scoring paddocks for the level of oestrogenicity of their pastures. All producers were confident to score their own paddocks for oestrogenic cultivars using the technique learnt. Participants also collected clover leaves to be sent for laboratory analysis for isoflavone levels. Results provided an indication of the potency of the clover isoflavone levels which are likely to affect sheep fertility.

Being able to identify the three 'bad' clovers enables producers to ascertain which paddocks could be renovated and the class of stock which they would allow to graze them. Producers can also use the technique for assessing how successful pasture renovations are by objectively assessing the establishment of new cultivars and reduction of 'bad' cultivars.

Figure 1: Dinninup spring leaflet, highly oestrogenic.

Paddock surveys

The paddock surveys provided a more comprehensive view of the extent and severity of oestrogenic pastures across the fire scar. Objective pasture assessment was conducted on 21 properties, with 73 paddocks.

Oestrogenic clovers were found in every paddock tested. Oestrogenic cultivars had a range from 4% to 100% of the clover component. Levels of >30% of oestrogenic cultivars in a pasture mix is a concern. 63% of paddocks assessed had levels greater than 30% of oestrogenic cultivars in the clover mix. Dinninup and to a lesser extent Dwalganup were the bad cultivars predominately found in pastures; Yarloop has diminished in its presence.

Many producers were unaware that the Dinninup cultivar was present in their pastures and in such high numbers. It is understood that the Dinninup was a contaminant cultivar of other cultivars purchased.

Comparison with historic data from a previous clover project in 2017 shows a consistent prevalence of oestrogenic clovers

before and after the fire (see Table 1). It seems the fire had no impact on increasing oestrogenics. In addition, paddocks which had previously had effective pasture renovation had much lower levels of oestrogenic clovers than unrenovated or poorly renovated pastures.

Pasture composition (percentage of grass, weed and clover) can vary year to year due to the seasonal break, cover levels, red legged earthmite control, stocking rate and other pasture management decisions. However, the ratio of oestrogenic versus non-oestrogenic clovers is governed by the ratio of seed reserves which is largely unchanged year on year unless significant change occurs such as pasture renovation.

Laboratory analysis of clover leaf samples collected while assessing pasture composition has provided further evidence that the three 'bad' cultivars are present in the many paddocks across the fire scar. The critical level of >1,000 mg/kg of the isoflavones, Formononetin and Diadzein, will start to effect sheep fertility. Of the samples tested, 74% had levels greater than 1,000mg/kg. Levels ranged from 9,330mg/kg in Dinninup dominated pasture in early spring to paddocks with low oestrogen cultivars at 229 mg/kg which were safer for ewe weaners and breeding ewes. Many paddocks had near critical levels, with the clovers senescing, producing the lower result.

Herbicide tolerant, low oestrogen clover development

PIRSA - SARDI Research Scientists has started a mutation breeding program developing low oestrogenic cultivars with novel herbicide tolerance , which would be a new tool to control oestrogenic clovers when conducting clover renovation.

Take Home Messages

- Producers learnt identification of three 'bad' oestrogenic clovers and were confident and able to assess their own pastures and improve decision making to match ewe weaners and young ewes to graze safe pastures.
- Three 'bad' oestrogenic cultivars Dinninup, Dwalganup and Yarloop are very prevalent in pastures across the Island.
- The fire did not cause the 'bad' clovers to increase in the pasture composition.

Hopefully these are pregnant ewes watching the first lambs of a good season on renovated pasture, rather than dry ewes envying a rare success on Dinninup!

	Pre-Fire 2017		Post-Fire 2021	
Hundred	**Bad cultivar %**	**Oestrogenic %**	**Bad cultivar %**	**Oestrogenic %**
Seddon 1	54% Dinninup 0.5% Dwalganup 9% Yarloop	**63% Oestrogenic**	58% Dinninup 1% Dwalganup 4% Yarloop	**63.5% Oestrogenic**
Seddon 2	67% Dinninup 14% Yarloop	**81% Oestrogenic**	93% Dinninup 7% Yarloop	**100% Oestrogenic**
Seddon 3	15% Dinninup 14% Yarloop	**29% Oestrogenic**	38% Dinninup 2% Yarloop	**40% Oestrogenic**
Ritchie 4	24% Dinninup 8% Dwalganup	**32% Oestrogenic**	16% Dinninup 22% Dwalganup	**38% Oestrogenic**

Table 1: 4 paddocks, Oestrogenic cultivar scores in Pre-Fire 2017 and in Post-Fire 2021

Funding & Sponsorship

- **The Kangaroo Island Oestrogenic Clover Project is a Local Economic Recovery project is jointly funded by the South Australian and Australian Governments under the National Disaster Recovery Funding Arrangements.**

Further Information

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Building Resilience & Profitability of High Rainfall Farmers

What's Happening

2021 was the final year in a three year project focused on building resilient farm businesses and strengthening farm decision making. Extensive workshops and activities were delivered to farmers (especially women and young farmers) and the wider farming industry to build confidence and skills. The culmination of the project has resulted in a website dashboard https://myfarmdashboard.sfs.org.au/ with optional push notifications of the four key parameters (soil moisture, pasture availability, commodity prices and climate data) thus providing information that increases farmer and agronomist ability to make better on-farm management decisions.

The project involved a collaboration between Southern Farming Systems, Federation University (Ballarat), Glenelg Hopkins Catchment Management Authority, MacKillop Farm Management Group and Agriculture Kangaroo Island.

During 2021, three Women on the Land workshops were held; Climate Workshops with Darren Ray and Leighton Wilksch; Resilience Mindset with Polly Hohn, and a bus trip amongst the north coast fire scar.

The recalibration of the new and improved Pastures from Space continued in 2021. In time, access to the pasture growth rates mapping will be found through the website listed above.

Soil Moisture Monitoring

The project partially funded the installation of up to 30 soil moisture probes across the high rainfall zone in Tasmania, Victoria and South Australia. On KI, three 120cm deep Adcon soil moisture probes were located at Bucks (Gosse), Heinrichs (Parndana) and Berrys (Birchmore). This information was uploaded every 15 minutes and can be found at the following address: http://toip-server.net.au:8080/custdata/agbyte/kihrz/agb_index.html (see QR code at the end of this article).

Summary points:

- During winter, rainfall events infiltrated to 120cm at all 3 sites. The Buck and Heinrich sites had periods where saturation limits were reached (evident in 'table top' flat lines following heavy rainfall).
- During spring, pasture growth was abundant and by December, root activity was around 110-120cm at the 3 sites.
- All 3 sites entered May 2022 with less total soil moisture compared to the previous 2 seasons.

From the start of July to into November, the Buck site showed no moisture draining from the profile in the lower 90-120cm

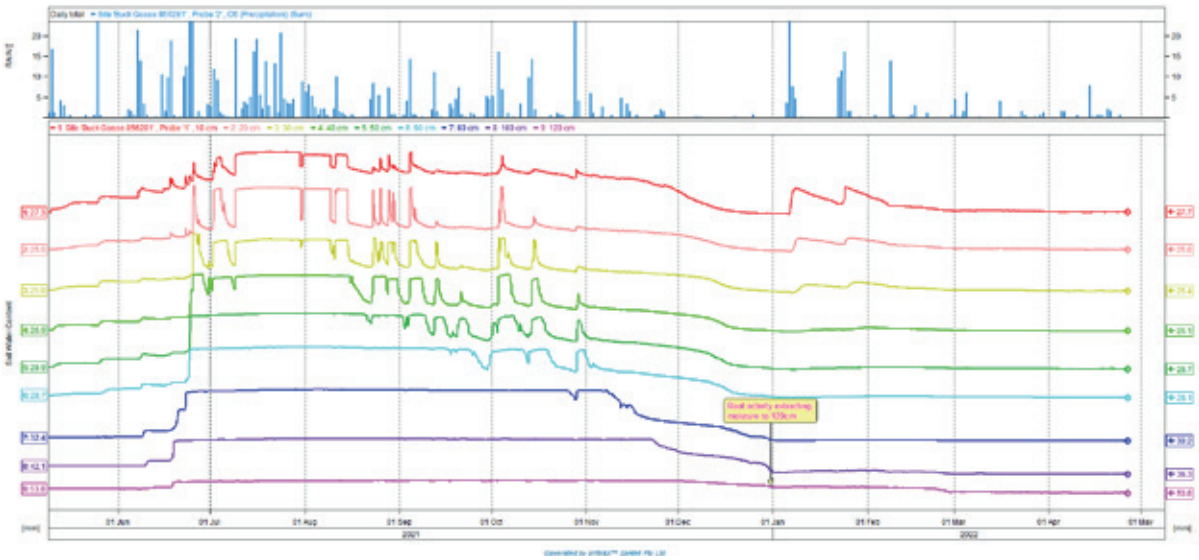

Figure 1: Buck Gosse site. Moisture sensor readings at varying depths in the soil profile.

profile, evidenced by the classic 'table top' line (Figure 1). The January 2022 rainfall event soaked to ~30cm. The site had some interesting diurnal fluctuations (= root activity) during February evidenced by a steep drop in moisture level at 120cm inferring that the roots were extracting moisture beyond 120cm. Pasture growth saw this moisture removed from the profile in the following months.

The Heinrich Parndana site saw a shorter saturation event from July to mid September at the 90-120cm depth (Figure 2). The January rainfall event soaked to around 60cm. The graph shows moisture moving out of the 10-40 & 50-80cm profile in February 2022. It's not certain if this was natural draining or root activity and evapotranspiration (there was not a lot of diurnal fluctuation present to confirm). Pasture growth during summer/autumn saw this moisture removed from the profile.

The Berry Birchmore site saw a saturation event at the 90-120cm depth from July to November (Figure 3). The January rainfall event soaked to ~30cm. The site still had residual moisture from the January rains going into May.

And whilst not directly involved in the project, the Bell Cygnet River site is a long term site and we feel it's important to publish the data. There was a lovely drawdown curve from mid August to mid December by the canola in 2021, showing there was minimal rainfall for infiltration and that the canola roots extracted nearly every bit of available moisture (Figure 4). The graph revealed that the lower profile (100-160cm) was actually the driest ever since the soil probe was installed in 2014.

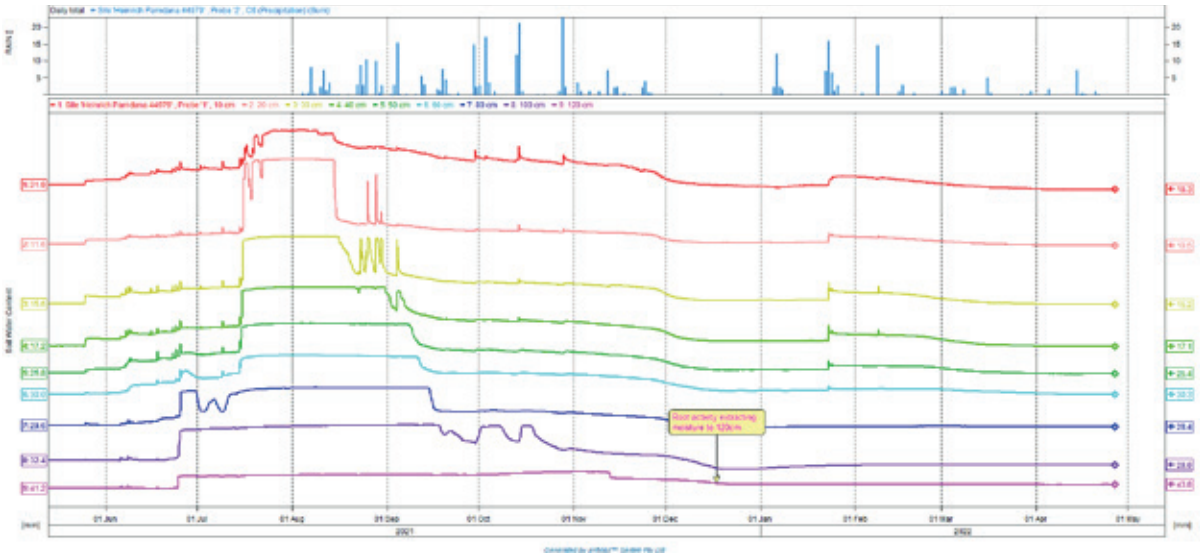

Figure 2: Heinrich Parndana site. Moisture sensor readings at varying depths in the soil profile.

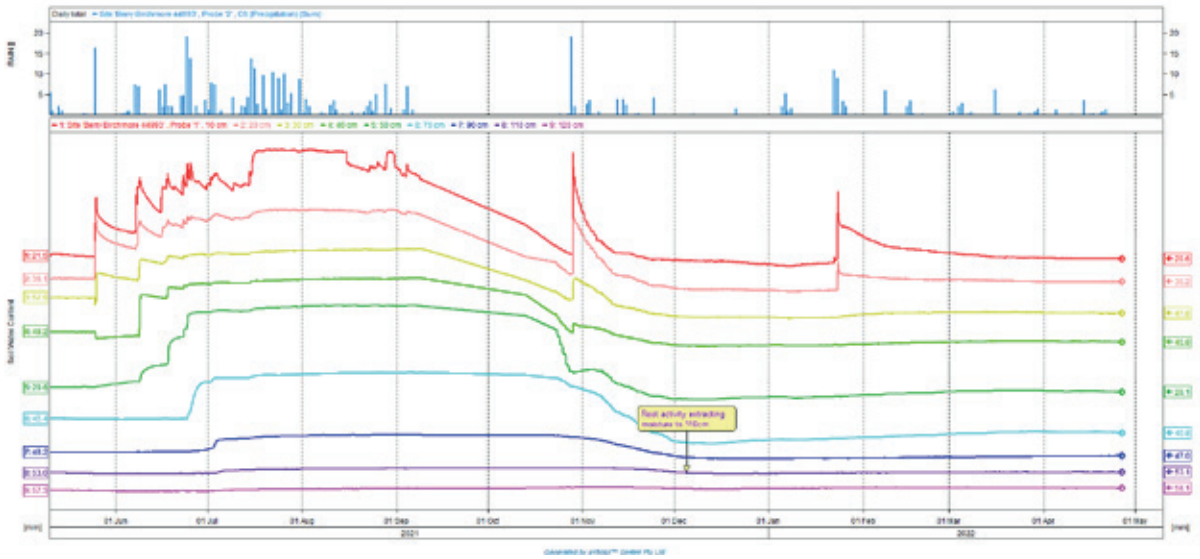

Figure 3: Berry Birchmore site. Moisture sensor readings at varying depths in the soil profile.

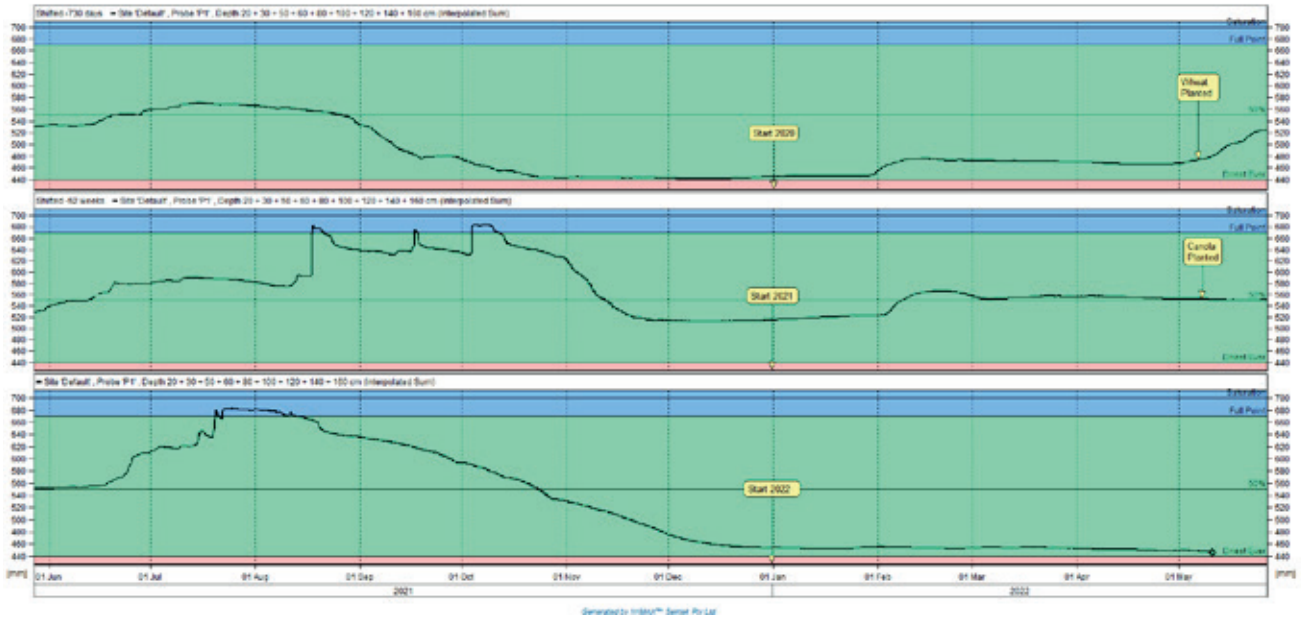

Figure 4: Bell Cygnet River site. Three year comparison of soil moisture levels.

Pasture Availability

The recalibration of the new and improved Pastures from Space continued ground truthing in 2021. The project aims to be able to provide estimates of pasture availability from satellite images, such as growth rates and feed on offer. Another feature being worked on was estimating historic pasture growth in the paddock. There were 22 paddocks being monitored on 22 farms. The paddocks are in South Australia (7 sites – 2 on KI), South West Victoria (9 sites), Gippsland (2 sites) and Tasmania (4 sites). The resolution of the new Pastures from Space is intended to be around 10m^2 pixels instead of the previous 6ha pixel.

On KI, pasture calibration cuts were taken from a perennial kikuyu pasture on Bucks and an annual pasture on Berrys. Five pasture cuts were taken between June and December 21 at the Buck site with ~6.5tonne of dry matter recorded. Three pasture cuts were taken at Berry site between May and November 21 with ~5.7tonne of dry matter recorded (Figure 5).

Take Home Messages

- The subsoil of each of the soil moisture probes was the driest it has been since the soil moisture probes were installed.
- Visit the site "My Farm Dashboard" at myfarmdashboard.sfs.org.au and acquaint yourself with the tools on offer.
- A workshop will be held later in 2022 to assist farmers in using the dashboard. Dashboard QR code below:

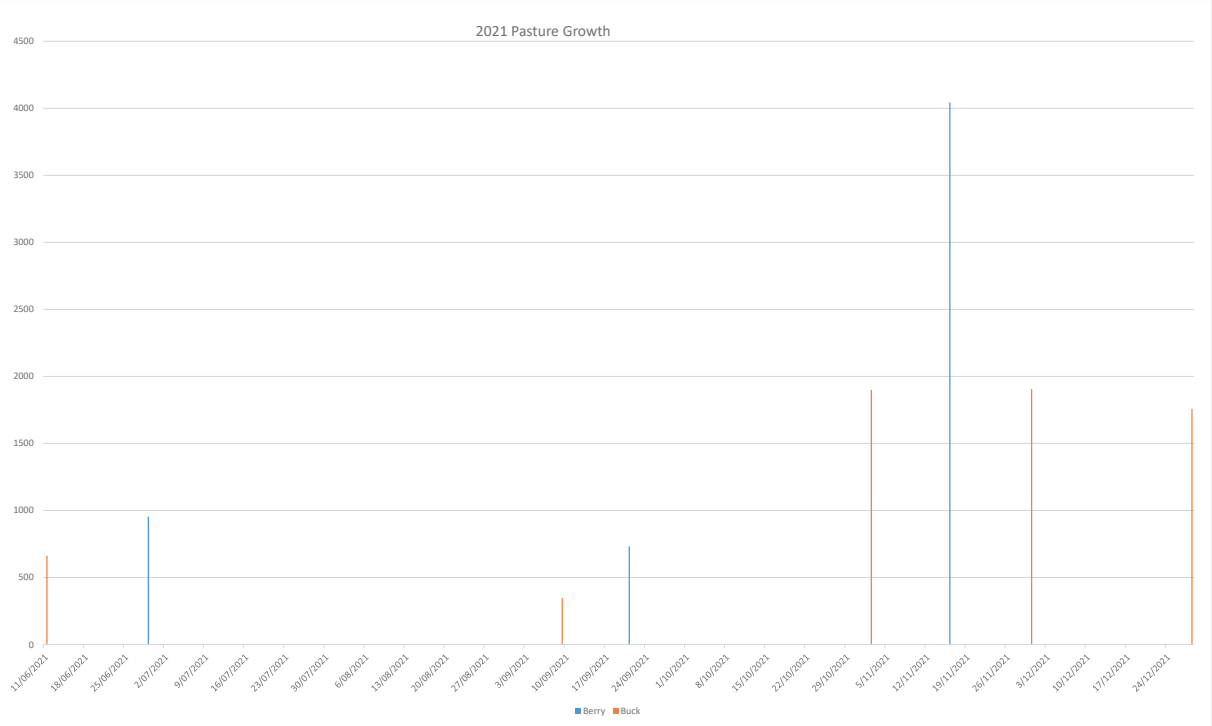

Figure 5: Kg/ha dry matter removed at the Buck & Berry sites during 2021.

Funding & Acknowledgements

- National Landcare Program (Smart Farming Grants)
- Berry Partners
- Buck Pastoral
- A, T & J Heinrich
- Ag KI for administering the funding

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High Rainfall Zone Weather Monitoring: online updates for KI sites.

2021 Parndana Small Plot Fertiliser Trial

Background

The BioAg fertiliser trial was established in 2019. The trial has 6 treatments with 4 replications and compares various BioAg products and rates against an annual application of single super. In 2021, the site received the annual and biennial applications of fertiliser.

The site is located on M & M Tremaine's at the big bend on the Playford Highway east of Parndana. The pasture is an annual regenerating pasture. In 2019, the composition was 70:30 clover:capeweed. The site was burnt in January 2020 and it is likely that this influenced capeweed to dominate the sward with the ratio tending 10:90 clover:capeweed in 2020. In 2021, the composition of the sward was beginning to be more inclusive of grasses with approximately 20% grass and 80% capeweed.

What was done

The biomass was measured by mowing with a push behind mower and weighing the catchings. The site was not grazed.

Unfortunately, an application of single super fertilizer was spread across the site by a contractor at the beginning of 2021. The site was mown to try and 'suck up' the fertilizer granules but wasn't really successful. Below is a summary from the site from the past 3 years. In 2021, only one cut was taken in November.

Results

There was no significant difference on a dry matter basis between all fertilizer products during the 2021 season, nor was there an effect of the cumulative amount over the three years.

The site is an unresponsive P site.

Treatments	Product & Rate	P	S
A	CONTROL	0	0
B	275kg/ha BioAg Superb (8.6P, 6.9S) - biennial	23.65	18.975
C	200kg/ha BioAgPhos S10 (11.7P, 10S) - biennial	23.4	20
D	125kg/ha Single (8.8P, 11S) - annual	11	13.75
E	135kg/ha BioAg Superb (8.6P, 6.9S) - annual	11.61	9.315
F	275kg/ha Superb (8.6P, 6.9S) + 2t lime +TE - biennial	23.65	18.975

Table 1: Treatments and kgs of P and S applied at time of application

Photo taken November 2021.

Funding & Sponsorship

- BioAg
- M & M Tremaine

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Treatment	2019	2020	2021	Mean
Control (A)	12029	9998	3871	8708
275kg Superb – biennial (B)	12023	9797	4146	8570
200kg PhosS10 – biennial (C)	11734	10373	3927	8749
125kg Single – annual (D)	12112	9930	3683	8540
135kg Superb – annual (E)	11596	9881	4177	8640
275kg Superb+lime+Trace Elements –biennial (F)	11911	10029	4296	8745
P val	0.964	0.893	0.638	0.969
SE	844	751	499	478
CV	8%	6%	14%	5%
P val (rb)	0.965	0.861	0.757	0.975

Table 2: Means and standard errors of each treatment at each harvest time. Units are kg/ha

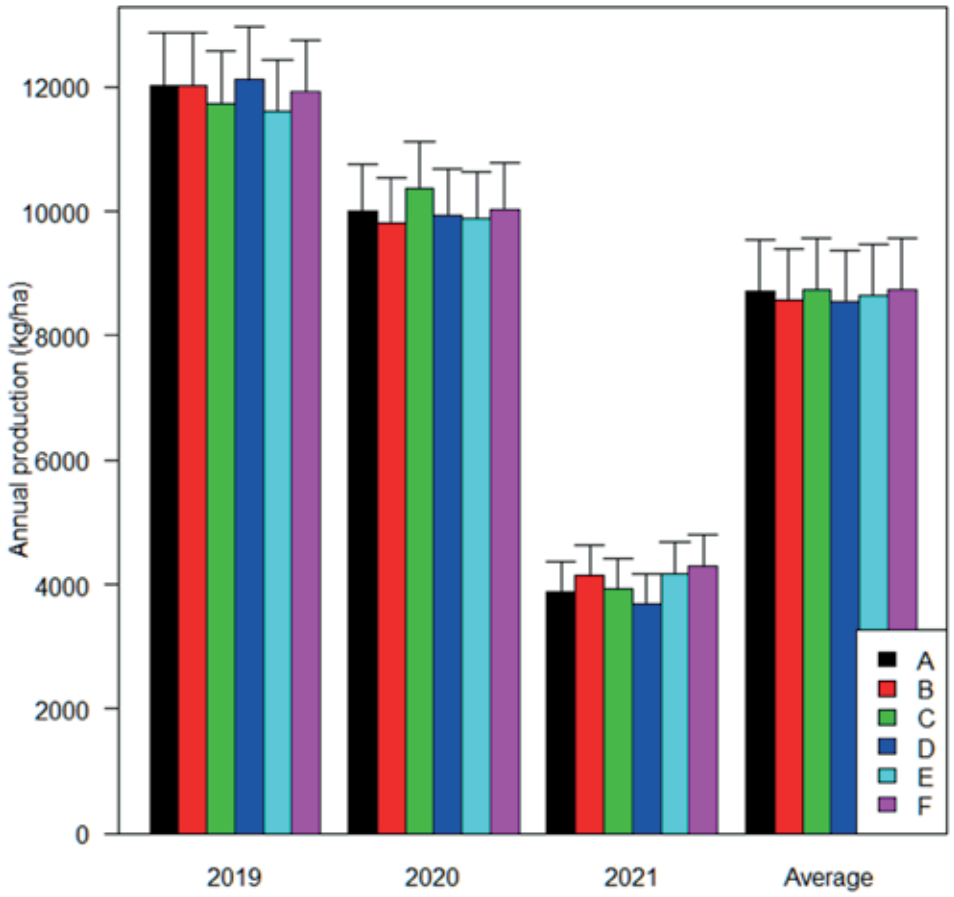

Figure 1: Bar plot of averages across treatments of cuts at each date for Parndana trial. Error bars are standard errors. Refer to codes in Table 1 to identify treatments. Data analysed by Rho Environmetrics Pty Ltd.

2021 Stokes Bay Small Plot Fertiliser Trial

Background

The BioAg fertiliser trial was established in 2019. The trial has 6 treatments with 4 replications and compares various BioAg products and rates against an annual application of single super. The biomass is measured by mowing with a push behind mower and weighing the catchings. The site is not grazed. In 2021 the site received the annual and biennial applications of fertiliser.

What was done

The site is located on W & J Stantons at Stokes Bay on a sandy soil. The pasture is a perennial veldt grass and serradella with a light smattering of capeweed and annual ryegrass. The site experienced a hot burn in January 2020 with the treatments closest to the scrub line suffering the most damage to the pasture base. This was still evident in 2021 and the data from these plots has since been removed from the analysis.

The 2021 season broke in mid-May meaning that pasture leaf area/size was small going into the cold wet winter. Fortunately spring rains continued into November. Three cuts were taken during 2021. Since there are now 3 years of data the means per year are reported.

Results

There was no significant difference on a dry matter basis between all fertilizer products, nor was there an effect of the cumulative amount over the four harvest times.

Treatments	Product & Rate	P	S
A	CONTROL	0	0
B	275kg/ha BioAg Superb (8.6P, 6.9S) - biennial	23.65	18.975
C	200kg/ha BioAgPhos S10 (11.7P, 10S) - biennial	23.4	20
D	125kg/ha Single (8.8P, 11S) - annual	11	13.75
E	135kg/ha BioAg Superb (8.6P, 6.9S) - annual	11.61	9.315
F	275kg/ha Superb (8.6P, 6.9S) + 2tlime +TE - biennial	23.65	18.975

Table 1: Treatments and kgs of P and S applied at time of application

Funding & Sponsorship

- BioAg
- W & J Stanton

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Treatment	2019	2020	2021	Mean
275kg Superb – biennial (B)	10001	4016	5060	6359
200kg PhosS10 – biennial (C)	9370	3257	4259	5629
125kg Single – annual (D)	9347	2741	4082	5390
135kg Superb – annual (E)	9364	3620	4573	5852
275kg Superb+lime+Trace Elements –biennial (F)	10006	4110	5209	6442
SE	417	389	399	342
CV	9%	22%	17%	12%
P val (rb)	0.349	0.203	0.358	0.230
Covariate	99	-1292	-1318	-898
SE of Cov.	421	472	441	389

Table 2: Means and standard errors of each treatment at each harvest time. Units are kg/ha

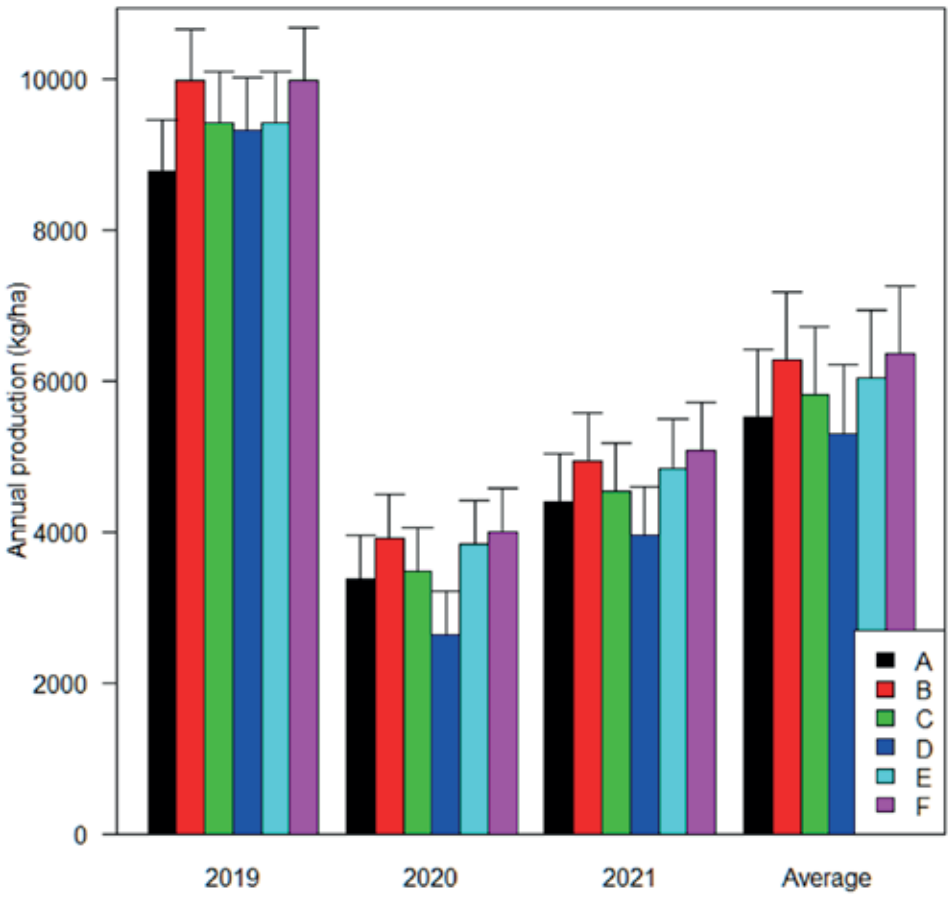

Figure 1: Bar plot of averages across treatments of cuts at each date for Parndana trial. Error bars are standard errors. Refer to codes in Table 1 to identify treatments. Data analysed by Rho Environmetrics Pty Ltd.

Soil Health Report 2021/2022

Background

With the increasing cost of fertilizers it's never been more important to test your soils. Soil testing allows you to more accurately determine what type and how much fertiliser you should be applying or if you need to lime. PIRSA provides a soil testing service for all producers. We provide the soil testing kit and can even assist with the soil sampling. All results come with a detailed interpretation of the test results. Call into the PIRSA office in Kingscote to find out more. In 2021/22, 26 KI farmers submitted 84 soil samples for testing.

Results

Soil pH

Soil pH is important for optimum production of crops and pastures. If the soil pH falls below pH 5.5 (CaCl2) then nutrients such as phosphorus, magnesium, calcium and molybdenum become less available; microbial activity starts to decline (including Rhizobia) and toxic amounts of aluminium can be released into the soil solution (refer to Table 1 for minimum pH targets).

LAND USE	pH ($CaCl_2$)
Extensive grazing	5.0 – 5.5
Broad-acre cropping/grazing	5.5
Most horticultural crops	5.5 – 6.5

Table 1: Target for minimum soil pH.

Almost all the soil samples taken during the 2021/22 seasons were below critical pH levels. Figure 1 shows that the average pH in all Hundreds was below 5.5 pH_{CaCl2}. Five of the seven Hundreds had an average pH of 5.2 or below. At these levels, pH will be limiting farm productivity and profitability and therefore liming should be a high priority.

Salinity

Saline soils are defined as soils that contain a high enough level of soluble salts in the root zone to adversely affect plant growth. Ideally, soils should have a salinity level of less than 2 dS/m (for salt sensitive plant species). Of the soil samples taken the majority were below 2 dS/m.

Organic Carbon

The organic carbon test is a useful indicator of organic matter status, therefore of overall soil fertility, microbial activity, and the structural stability of the soil. The ideal target level of organic carbon varies with soil type i.e. sandy soils greater than 1% is desired, through to greater than 2% in clay soils. Of the soils tested, all were well above critical values.

Soil Nutrients

Maintaining an adequate nutrient status in the soil is paramount to determining the productivity of the soil. Phosphorus, potassium and sulphur are essential nutrients for plant growth and yield (see Table 2 for target levels).

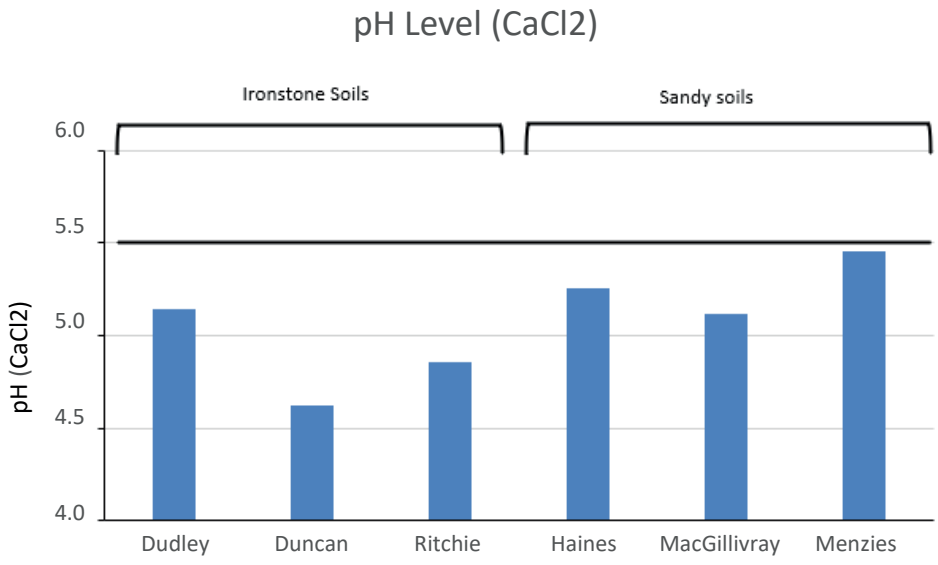

Figure 1: Average soil pH (CaCl2) results for each Hundred during the 2022 seasons. The black line shows critical value.

SOIL NUTRIENTS	TARGET LEVELS	
	IRONSTONE SOILS	SANDY SOILS
Phosphorus (Colwell)	35-45 mg/kg	>20 mg/kg
Potassium (Colwell)	>120 mg/kg	>120 mg/kg
Sulphur	6-8 mg/kg	>10 mg/kg

Table 2: Target levels for phosphorous, potassium and sulphur

During 2022, almost all samples collected from the Hundreds with predominantly sandy soils had phosphorus levels greater than 20 mg/kg. Of the Hundreds with predominantly ironstone soils, the majority of samples had phosphorus levels lower than the recommended level of 35-45 mg/kg (Figure 2).

Three hundreds had potassium levels below the critical values of 120 mg/kg (Figure 3).

Of the Hundreds with predominantly ironstone soils, the majority of samples had sulphur levels greater than 6-8 mg/kg, except for the Hd Ritchie (Figure 4). The majority of sandy soil samples, except the Hundred of MacGillivray, had samples below the critical value of 10 mg/kg.

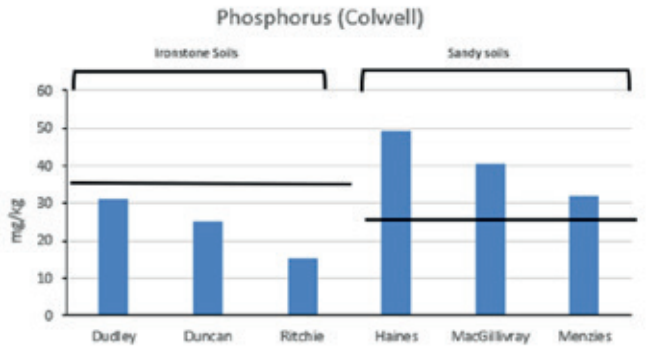

Figure 2: Average soil phosphorus levels for each Hundred during the 2021-22 season. The black line shows critical value.

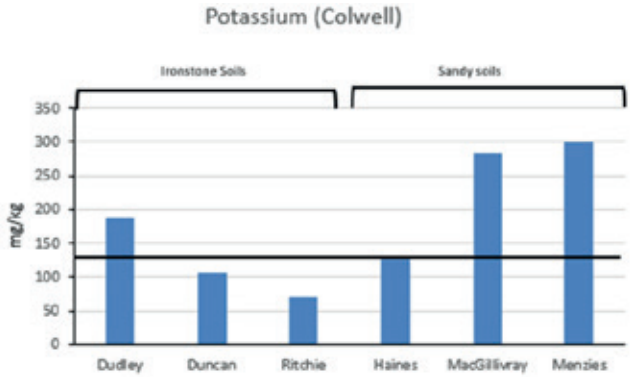

Figure 3: Average soil potassium levels for each Hundred during the 2020-21 season.

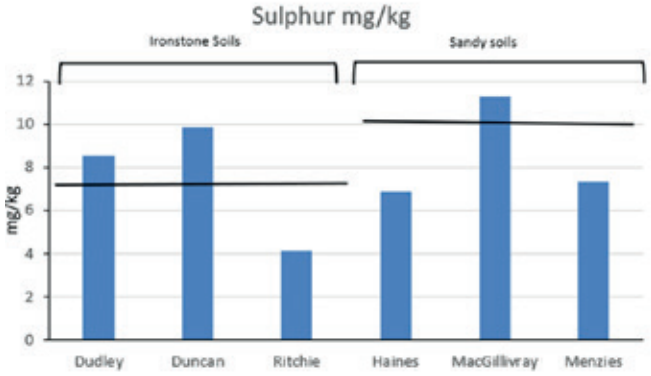

Figure 3: Average soil sulphur levels for each Hundred during the 2021-22 season.

Summary

The 2022 soil tests carried out by Kangaroo Island farmers indicate that overall, soils in the area are on target or above for organic carbon.

The average soil phosphorus levels were low in the predominantly ironstone soil hundreds. Potassium and sulphur were also low in some hundreds. Across the Island, soil pH_{CaCl2} levels were below critical values. Low pH results in the availability of essential nutrients, such as phosphorous, being reduced. As a result areas with low pH may have lower overall farm productivity.

The most cost effective and practical way to address low pH is through the application of lime. Low nutrient levels can be addressed through the application of fertilisers. Always seek advice from your local agronomist or consultant to ensure you are applying the right fertiliser or lime at the correct rate.

Soil types vary within each Hundred, so care must be taken in the broader interpretation. In addition, the data only reflects the number of samples taken in each Hundred, which may represent only a few properties. The data and resultant graphs can only be interpreted to the point of identifying trends over time.

Take home messages

- Soil testing is essential for monitoring soil fertility levels.
- PIRSA provides an soil testing service for all farmers – from provision of kits, to taking the soil samples to interpretation of results.
- Of all the soil samples taken the majority were below critical levels for pH.
- Phosphorus, potassium and sulphur levels were low on some properties.

	Organic Carbon %	Conduct-ivity dS/M	pH ($CaCl_2$)	Phosph-orous mg/kg	Potassium mg/kg	Sulphur mg/kg
Haines (21)	2.2	0.1	5.3	49.4	127.7	6.8
MacGillivray (33)	3.4	0.2	5.1	40.7	284	11.3
Menzies (12)	2.5	0.2	5.5	31.9	299.1	7.3

Table 3: Summary of results for sandy soils. Note mg/kg is the same as ppm. The number in the brackets refers to the number of soil samples taken per Hd.

	Organic Carbon %	Conduct-ivity dS/M	pH ($CaCl_2$)	Phosph-orous mg/kg	Potassium mg/kg	Sulphur mg/kg
Cassini/Duncan (4)	4.3	0.2	4.6	25.3	106	9.9
Dudley (12)	2.6	0.1	5.1	31.2	186.8	8.6
Ritchie (7)	2.3	0.1	4.9	15.3	219.6	4.1

Table 3: Summary of results for ironstone soils.

Funding/Sponsors

- AgKI through the Australian Government National Landcare Program Smart Farms Small Grants
- KI Landscape Board through the Australian Government National Landcare Program Smart Farms Small Grants
- PIRSA

Note: The information used was sourced from individual Kangaroo Island farmer soil tests and analysed using CSBP Analytical Laboratory.

Further Information

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Down and Dirty

Background

'Down and Dirty' is possibly not what you are thinking it is! It's the name of a new soils project being run for landholders on KI. The focus is on monitoring soil biological activity and subsoil pH.

Biologically active soils are an important indicator of soil health and in turn, a productive farm. But how do you know how biologically active your soil is? Lab testing can be complex and costly. A simple and fun way to measure soil biology is the "undie test". Underpants are buried in the soil, the rate of decomposition being an indicator of soil biological activity.

Soil acidity is a significant issue on Kangaroo Island and can result in poor pasture and crop growth. If acidic paddocks are not limed, the topsoil continues to acidify and the acidic layer spreads down the soil profile. Acidic layers at 5 to 15 cm depth are becoming increasingly common, even where topsoils have been limed. Sending soils away to a lab is costly and time consuming, but using a soil pH test kits gives you the results on the spot.

What's being done

PIRSA has FREE kits available for landholders to collect to enable them to monitor their soil biological activity and/or the subsoil pH.

1. The Undie Test

Monitoring your soil biological activity is easy (and fun!). Firstly, pop into the PIRSA Kingscote office to collect a kit. The kit contains a pair of 100 per cent white cotton undies and a marker peg. Dig a hole and bury the undies in the topsoil for two months. After two months (this is why you need the marker peg!), dig up the undies and check for the level of decomposition. If there's not much left of the undies there is good biological activity, which indicates healthy soil. These same soil organisms that break down the cotton can break down plant materials in a similar way and help to cycle nutrients.

2. Monitoring your sub soil pH

To measure your sub soil pH, collect a FREE pH soil test kit from the PIRSA office. Select a site (ideally 4 – 5 sites across a paddock) and with the spade, dig a hole to approximately the depth of the shovel blade. Remove a wedge of soil with the spade. Apply the dye (from the soil pH kit) in a line down the soil about 1-2 cm wide. Take care because the dye will semi-permanently stain your fingers! Apply a liberal dressing of powder onto the dye. Give the dye/powder 30 sec to achieve full colour change and then read the pH score using the colour chart.

If the soil is reading pH 5 or lower follow up with a proper lab test (soil test kits are available from the PIRSA office).

Figure 1: Soil testing kits are available FREE from the PIRSA office. This shovel-full of soil is quite acidic, indicating the paddock needs lime.

Results

1. The Undie Test

Photos 1, 2 and 3 show buried undies that have shown a wide range of decomposition, depending on the soil and its level of biological activity:

Undies 1: Buried under a pine tree plantation.

Undies 2: Buried in pasture.

Undies 3: Buried in a vegetable garden.

1. Monitoring your sub soil pH

The subsoil pH samples highlighted several paddocks that had been recently limed, but had a 5-15 cm layer with a pH well below 5. This 'acidic band' indicates that although you may have limed, the lime is not moving through the soil. This 'acid throttle', when soil pH falls below 5, can severely limit root growth and the plants' access to water and nutrients.

The solution is to lime. Lime should be applied at rates to keep the surface pH_{CaCl2} at 5.5 or more in the top 10cm of soil. As lime usually moves very slowly in soils, about 1cm a year at best, incorporating lime through strategic cultivation is recommended when treating subsoil acidity.

The more vigorous the soil disturbance after lime application, the faster the soil will be neutralised (e.g., spading or large offset discs is ideal). As many soils contain a combination of chemical and physical constraints, such as acidity and water repellence and/or compaction, strategic deep tillage to depth can help solve multiple issues in a single pass whilst maximising the potential gains in production.

Take home messages

- Burying undies provides a simple (and fun) means of determining how biologically active your soil is.
- Sub soil acidity is a key constraint to crop and pasture growth. Monitor your subsoils and then lime to ensure the top soil remains above 5.5.
- Consider a once off strategic incorporation of lime if required.
- Call in to the PIRSA office to collect free undies and acidity kits.

Funding/Sponsors

- **AgKI through the Australian Government National Landcare Program**
- **Ingrams Home Hardware**

Further Information

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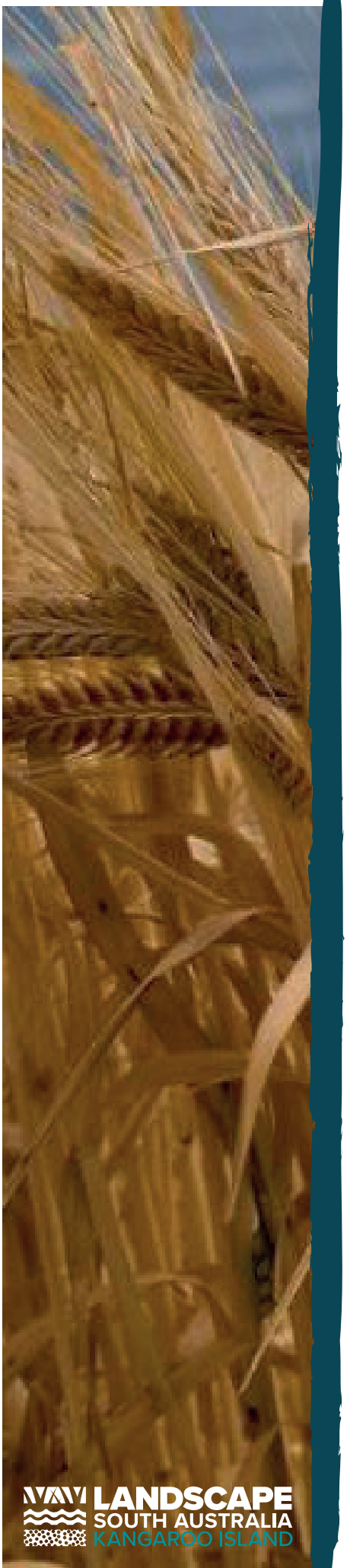

Sustainable primary production and the island's economy

The Kangaroo Island Landscape Board is here to support KI farmers and are committed to working with the island's farmers to increase the sustainability, resilience and adaptability of our primary production industries. Key roles within the sustainable landscapes program include:

Regional Agriculture Landcare Facilitator: works to connect farmers with information you need to increase sustainable agriculture practices. Your input and feedback can help shape this role.

Landscape Officer – Soils: Supporting farmers and farming groups to improve soil and landscape health through the provision of technical advice and information services that promote best practice in soil and land management.

Water Officer: Supporting the sustainable management of the island's water resources, through the provision of advice on Water Affecting Activity permits, erosion control, construction of crossings, water security plans and the management of the Boards water resources monitoring program.

Up-coming opportunities for farmers

Property Management Planning: The Kangaroo Island Landscape Board is seeking expressions of interest from farmers who are interested in increasing on-farm drought resilience through the development of comprehensive property management plans. The project will facilitate the development of property management plans that will be designed to provide land managers with the tools and capacity to adapt, reorganise, transition, and transform their properties in preparation for drought and less reliable and more variable seasons.

Up-front engagement with participants will identify specific landholder business and land management needs and ensure appropriate consultants are engaged to support land manager's at a highly targeted level. Consultants engaged are likely to include specialists in soil, grazing, pasture, cropping, horticulture, animal health, biosecurity, water management and water security, integrated pest management and tools and technologies. Funding is also available to assist participants with the implementation of their plans.

For more information or to register your interest please contact Joseph Sullivan, Manager Sustainable Landscapes on 0477 989 925 or email Jo.Sullivan@sa.gov.au

Landscape SA Soil Extension Project: Kangaroo Island Landscape Board are seeking expressions of interest from farmers who are interested in receiving funding to establish trails and demonstrations of sustainable agricultural practices that have the potential to improve soil health and increase resilience and adaptability. Potential trails and demonstrations may include the incorporation of bio char into soils, increasing soil carbon and the establishment of mixed cover crop and perennial pastures. But if you have other ideas please let us know.

For more information or to register your interest please contact Cassandra Douglas-Hill, Landscape Officer — Soils on 0437 172 877 or email Cassandra.Douglas-Hill@sa.gov.au

These projects are supported by the Kangaroo Island Landscape Board through funding from the Australian Government.

Active Management Required to Maximise Pasture Growth

Background

Pastures and crops need nutrients to grow, just like humans do. They need the right soil pH_{CaCl2} (above 5 and ideally above 5.5 to stop sub soil acidification), the right nutrients in an available form, organic matter (to help retain nutrients and soil moisture), good soil structure (to allow for root growth) and a variety of micro-organisms to support plant growth.

Crops and pastures don't care where the nutrients come from – in a bag or from soil reserves or from added composts etc., as long as the soil has sufficient reserves to promote growth. Every time we 'harvest' we are removing nutrients, be it in hay, grain, wool or meat. Those nutrients need to be replaced or improvements made to the soil to increase nutrient availability if we wish to maintain productivity.

What was done

Two sites were selected on the same soil type, approx 300m apart. Both have been grazed with livestock for the last 30 years (i.e. no cropping or hay cutting). Site 1 has been limed four times (1990, 1997, 2007, 2017) at a rate of 2.5t/Ha and has had an annual fertiliser program with the equivalent of 130kg single super phosphate. Stock on this site are rotationally grazed to match stock feed requirements to FOO (Food On Offer). Site 2 has had no fertiliser or lime applied for approximately 30 years and is set stocked.

Photos of the sites were taken in September 2021 and both sites were soil tested in March 2022 with the samples sent to the same lab for analsyis.

Results

The results (refer to Table 1) show a clear difference in nutrients (especialy phosphorus and to a lesser extent sulphur) and pH between the two sites.

The pH in site 2 is well below critical levels. Once pH drops into the 4s it will impact not only on nutrient availabilty (making many nutients unavailable to plants) but will also negatively impact on soil biological acitivity. Soil biological activity is essential for the breakdown of organic matter and the cycling of nutients in the soil and also allows clovers to fix nitrogen.

Phosphorus in site 2 is well below the recommeded level of 25-29 mg/kg The low level of P in site 2 is directly impacting the productiuvity of the pasture.

Both sites have excelllent potassium levels. This is a direct result of the potassium rich clay subsoils found in this location.

Sulphur is marginal in site 2, although not as deficient as the phosphorous. This is most likely due to the 'free' sulphur we receive on KI due to our close proximity to the coast (the sea 'sulphur' which comes with our seabreezes) plus the sulphur that is tied up in organic matter.

Organic matter is higher in site 2. This is due to the low pH (i.e. highly acidic) soil at site 2. As mentioned above, as soils acidify the biological activity of the soil slows. As biological activity slows, so does the breakdown and cycling of the organic mater in the soil. Often highly acidic soils can have high organic matter levels in the top soil; the organic matter can actually be pulled away as a mat of organic residues which have not broken down, and are sitting on the surface of the soil.

Take home messages

- If you want to grow productive pastures/crops then you need to 'feed' or actively manage the soil to maintain productivity.
- Allowing soil pH to decline not only impacts on nutrient availability but also soil health.
- Regular soil testing (using the same sampling transect, same laboratory and sampling at the same time to the same depth) enables you to monitor your pH and available nutrient levels.

TEST	RECOMMENDED LEVELS	SITE 1: (strong lime & fertiliser history)	SITE 2: (no lime or fertiliser for 30 years)
pH_{CaCl}	<4.8 lime immediately 4.8-5.2 lime soon	5.7	4.5
Ext. Phosphorus (Colwell) mg/Kg	25-29	33	12
Ext. Potassium (Colwell) mg/kg	120-250	139	178
Sulphur mg/Kg	6-8	10	7
Organic Carbon %	>1.8	2.09	3.40
Ece (Conductivity) dS/m	<2 low salinity	1.23	0.89

Table 1: Nutrient & pH results

Figure 1: Site 1 photo taken September 2021.

Figure 2: Site 2 photo taken September 2021.

Further Information

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Lime Trials

Background

Soil acidity is the most significant land degradation issue on Kangaroo Island with an annual loss of production cost of more than $1.5 million. Liming is the best way to treat acid soils but how do we do this most effectively and efficiently? A research trial has been running for three years on KI. There are two parts to the trial:

- Rate response trial – comparison of three rates of surface-applied lime sand with a control (no lime)
- Novel treatment (rate, incorporation) trial – comparison the effectiveness of high rates of lime and incorporation (using offset discs) to manage sub soil acidity.

Agriculture Kangaroo Island (AgKI) are delivering this trial as part of a multi-state project. There are 10 sites in total – one on Kangaroo Island, two in the South East of South Australia, two in Tasmania, two in Gippsland and three in Southwest Victoria. Whilst 2021 was the last year of the trial, GRDC has agreed to provide ongoing funding ensuring that we can continue to monitor and learn from the trial site.

What was done

Rate Response Trial

The trial site was established in early 2019, on Simon & Marisa Veitch's property off Jenkins Rd, MacGillivray. The starting topsoil (0-10cm) pH_{CaCl2} was 4.8; for the rate response trial, the following treatments were randomly applied in four replicates, using local lime sand:

- Control: no lime was applied
- Treatment 1: low rate of 0.5t/ha to target a rise in pH_{CaCl2} from 4.8 to 5.0 (0.6t/ha lime sand)
- Treatment 2: moderate rate of 1.8t/ha to target a rise in pH_{CaCl2} from 4.8 to 5.5 (2.4t/ha lime sand)
- Treatment 3: high rate of 3.2t/ha to target a rise in pH_{CaCl2} from 4.8 to 6.0 (4.1t/ha lime sand)

Novel Treatment Trial

For the novel treatment trial, four treatments and a control were applied in four replicates at each site, to improve the starting pH_{CaCl2} from 4.4 (topsoil 0-10cm), 4.6 (subsoil 10-20cm) and 4.9 (20-30cm) to 5.8 (0-10cm), 5.3 (10-20cm) and 5.0 (20-30cm). A set of offset discs were used to incorporate the lime in applicable plots. The treatments are as follows:

- Control: no lime + no cultivation
- Treatment 21: farmer rate surface lime – applied at 1.85t/ha (2.5t/ha lime sand)
- Treatment 22: high rate surface lime – applied at 4.0t/ha (5.4t/ha lime sand)
- Treatment 23: high rate surface lime + incorporation – applied at 4.0t/ha (5.4t/ha lime sand)
- Treatment 24: incorporation only (no lime)

The site was sown with lupins in 2019, wheat in 2020 and a hay mix in 2021. The site was soil sampled in Dec 2021. As the site was sown to hay, no yield data was recorded.

Results

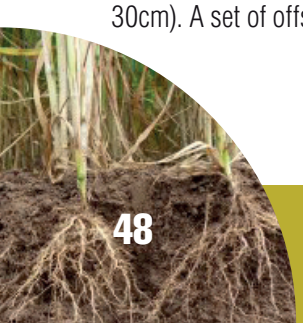
Soil pH changes down the profile were measured in the novel treatments trial. pH was measured in increments of 0-5, 5-10 and 10-15 cm down the profile and compared to the control (no lime applied) in December 2021 (refer to Graph 1).

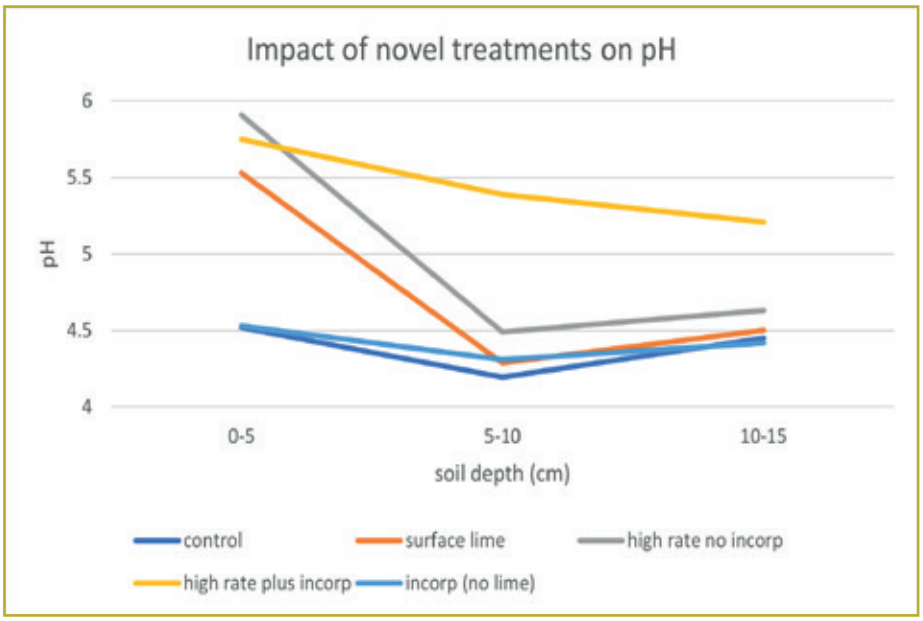
As expected, the high rate of lime (5.4t/ha lime sand) treatments had the greatest impact on soil pH, increasing the soil pH by almost 1.5 units in the topsoil. The incorporated lime increased pH by more than 1 unit in the 5-10cm & 10-15 cm layer. Whilst incorporation of the lime provided the highest increase to depth, surface application of the high rate still had some impact at depth.

Surface application at 2.5t/ha improved the topsoil pH by almost 1 unit in the top 5 cm but had less of an impact at depth.

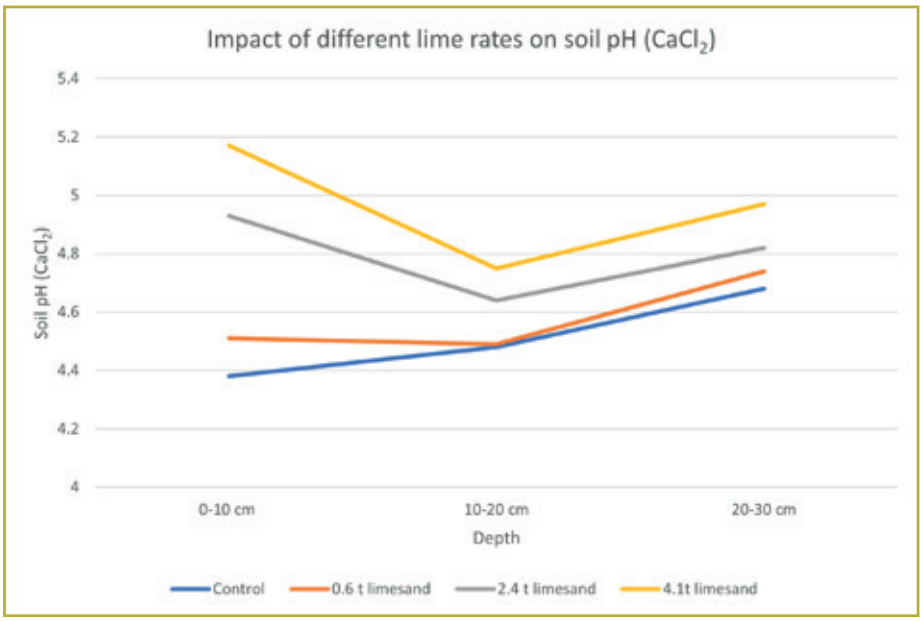
These initial results indicate that to change soil pH at depth ideally requires some form of incorporation and/or higher application rates. Graph 2 is further evidence that it will take higher rates of lime application to drive pH change at depth. This is of particular importance to KI, as we have significant issues with sub soil acidity. Once pH falls below pH_{cacl} 4.8, aluminium toxicity can occur. High Al levels burn the root hairs, inhibiting the plant's uptake of nutrients and water.

As expected, the highest rate of lime (4.1t/ha) had the greatest impact on improving soil pH right through the profile, increasing the soil pH by almost 0.8 of a unit in the top 10 cm. 2.4t/ha increased pH by just over 0.5 unit, but the low rate of 0.6t/ha had minimal impact on pH. Note there was no incorporation of lime with this trial.





Left: Graph 1: Novel trial – soil pH changes to 15cm.



Left: Graph 2: Rate response trial – pH changes at depth.

Take home message

- The most effective way to increase pH at depth is through incorporation plus higher application rates.

Funding/Sponsors

- AgKI in conjunction with Southern Farming Systems, through funding from the Australian Government's National Landcare Program.
- Simon and Marisa Veitch
- Project partners - Precision Agriculture, Federation University – the Centre for eResearch and Digital Innovation (CeRDI), Australian Fertiliser Services Association, Victorian Lime Producers Association, Victorian Department of Agriculture and Glenelg Hopkins Catchment Management Authority.

Further Information

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Biosecurity – Protecting KI Agricultural Industries

Background

The Kangaroo Island Biosecurity Rebuild Project is jointly funded by the South Australian and Australian Governments under National Disaster Recovery Funding Arrangements.

Activities of the project continue to increase community and visitor awareness of their role in supporting biosecurity protection for Kangaroo Island's agricultural sector and the natural environment.

What was done

The increase presence of biosecurity officers at Cape Jervis has resulted in a significant engagement with travellers, freight companies and the KI community. Key activities for the biosecurity officers are:

- Stopping restricted items such as honey, beekeeping equipment, unwashed potatoes and potatoes for planting
- During the fruit fly outbreak in Adelaide over the last summer, home grown fruit and vegetables from red zones was confiscated to reduce the risk of the pest entering KI
- Checking of compliance with livestock documentation requirements including National Vendor Declarations and Sheep Health Declarations
- Inspection of consignments of plants to ensure declared weeds were not present and remind gardeners of risks of weeds and plant disease being transported in soil
- Inspection of machinery including construction, earthmoving, agricultural and vegetation clearing machines to stress the importance of arriving clean on KI
- Ensuring recreational boats arriving are free of marine pests and aware of the sanctuary zones.

Since March 2021 the biosecurity team has checked 1109 ferry services at Cape Jervis, inspecting 33,383 vehicles, 229 boats, 598 consignments of plants and 372 machines.

There has been a noticeable increase in biosecurity awareness in companies bringing machinery to Kangaroo Island, with a general acceptance of the role they play in reducing the potential risk by taking steps to clean machinery prior to entry. This has included used potato harvesting and handling equipment which was found to be fully compliant with legislative requirements.

What has been a noticeable increase in concern is honey seizures, with 689 consignments of honey taken during the last year. This equates to around two lots per hundred vehicles and data sourced at the time of seizure would indicate most are first time travellers to Kangaroo Island with about half from South Australia.

Work to encourage travellers to KI to be aware of the biosecurity risks that have potential to impact the island has included an increase in signage at Cape Jervis along with an extensive social media campaign, working with tourism providers and in various publications.

New signage at Cape Jervis.





Above: Staff inspecting vehicles and comminicating with passengers at the Cape Jervis ferry terminal.

Right: Images from the marketing campaign.

Case study

Eradication of a European Wasp incursion

In late December 2022 an alert National Parks and Wildlife Service Ranger reported a sighting of unusual wasps hanging around a water tank he was filling at Wreckers Beach Campground, D'Estrees Bay. This area is part of the Cape Gantheume Conservation Park. He reported it to Biosecurity SA Kangaroo Island and was able to obtain some specimens which were subsequently identified as European Wasps (Vespula germanica).

European wasps are an agricultural, environmental, and social amenity pest where they are established on the mainland. They can cause damage to viticultural and horticultural production as well as impacting on honeybee production. If they became established on Kangaroo Island they would have an impact on the community, particularly in areas where people camp as they are attracted to food and drinks being consumed out in the open.

Historically, there have been several reports of European wasps on Kangaroo Island, but these have been individuals that probably hitch hiked here and did not become established. In this case, it was apparent that there was an active colony due to the large numbers of wasps sighted. Potentially a gravid female wasp, over wintering in building materials or a storage container, was brought over to Kangaroo Island in late winter and then emerged in spring to establish the colony.

Monitoring traps were placed in the vicinity of the detection to assist in locating the nest which would support any eradication efforts.

After several weeks of monitoring, the colony was located in a tree stump in thick scrubland about 500 metres from the campground. An experienced mainland-based pest controller with access to European wasp specific insecticides was engaged to destroy the nest. After several weeks of further monitoring, no more wasps were detected, and the eradication was deemed a success.

Photo: DAFWA

The key positive points to note are:

- The reporting of unusual wasp activity by NPWS immediately it was detected
- The rapid action taken to confirm the incursion and commence monitoring, surveillance and control activities
- Access to contractors / expertise as part of the biosecurity response arrangements of Biosecurity SA
- The interagency response and co-operation
- The successful eradication.

Take home messages

- If the community sees any unusual plants, animals or insects they should report it
- Response activities and resources are available and are put in place when high risks are identified
- Various agencies work together when high risks are identified
- Pests can arrive from the mainland – so everyone travelling to KI needs to be vigilant and aware of the role they play in protecting the Island's agricultural industries, environment and social amenity.

Funding/Sponsors

- **This information is supported by the Kangaroo Island Biosecurity Rebuild Project. The project is jointly funded by the South Australian and Australian Governments under National Disaster Recovery Funding Arrangements.**

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Weed Biosecurity After Fires

Background

The Kangaroo Island Biosecurity Rebuild Project is jointly funded by the South Australian and Australian Governments under National Disaster Recovery Funding Arrangements.

The weed component of the project aims to prevent the introduction of new weeds to Kangaroo Island following the bushfires, and prevent the spread of established weeds.

What was done

Luckily very few new weeds have been detected on KI as a result of fire fighting and fire recovery activities, despite concerns over the importation of large quantities of fodder. Instead the project has focused on providing advice around weed identification and control, and managing weeds which have spread following the fires. This includes a number of weeds which are responsive to fire, with the fires causing the soil seed bank to germinate and so resulting in a mass germination of seedlings. A number of garden plants, especially those from WA and the east coast of Australia, have escaped from gardens following the fires and spread into the neighbouring native vegetation where they can complete and exclude native plants.

Key activities for the weeds team have been:

- Detection and control of 2 high-risk agricultural weeds new to Kangaroo Island (Bathurst burr, African lovegrass)
- Detection and control of over 40 new weeds for KI
- Control of fire-responsive weeds (Tree lucerne, Albizia) on roadsides and house sites across western end of KI
- Control of the declared weeds Bulbil watsonia and Bluebell creeper on roadsides and Arum lily on properties
- Control of garden escapees around 36 burnt house sites across western end of KI
- 11 weed ID and control workshops with community groups, schools and government departments
- Working with over 100 KI landholders to answer enquiries, provide subsidies for control equipment and assist with weed control
- Delivering Year 1 of the Cape tulip Campaign which assisted 47 fire-affected farmers with Cape tulip control and has subsidised 17 farmers to date for the purchase of equipment to control Cape tulip
- Providing 3 locals with grants to become trained as weed control contractors
- Development of guidelines for future importation of fodder to prevent biosecurity incursions
- Initiating the Bluegum Steering Committee to coordinate stakeholders undertaking control of Bluegum wildings and campaign for support and funding for more control work.

Left: Garden escapees establishing in native vegetation after fire.

Case study - Cape tulip Campaign

In response to concerns from KI landholders around the proliferation of Cape tulip following the fires, it was determined that a large focus of the weeds project should be to assist fire-affected landholders with the control of Cape tulip. The Cape tulip Campaign was born.

The Cape tulip Campaign involved:

- Communications around best-practice Cape tulip control. PIRSA produced a 2 page flyer, distributed to KI landholders, outlining how to identify this weed, and the correct timing and methods of control. This is available on the PIRSA website
- Community workshops around Cape tulip identification and best-practice control methods, including demonstration of equipment suitable for Cape tulip control
- Cape tulip Blitz which mobilised 26 weed control staff from across SA to come to KI to undertake 500 hours of Cape tulip control across 12 properties at Karatta
- Assisting 47 fire-affected landholders with Cape tulip control by providing contractors and staff to undertake control in creeklines and areas of native vegetation
- 75 km of Cape tulip control on roadsides
- Providing subsidies to 17 farmers (to date) to purchase equipment such as weed wipers for controlling Cape tulip.

Future focus of the project

The weed component of the Biosecurity Rebuild Project has been extended until June 2023.

Work will focus on:

- Cape tulip Campaign Year 2 to further assist fire-affected landholders with Cape tulip control
- Follow-up control of treated weeds to ensure they have been sufficiently controlled
- Control of other Declared and fire-response weeds that have not yet been controlled, such as Coastal teatree, invasive wattles, pine wildings
- On-going surveillance for new weeds and assistance with weed identification and control.

Above: Cape tulip blitz 2021.

Funding/Sponsors

- **This information is supported by the Kangaroo Island Biosecurity Rebuild Project. The project is jointly funded by the South Australian and Australian Governments under National Disaster Recovery Funding Arrangements.**

Further Information

PIRSA Kingscote

P 8553 4949

Further resources for controlling declared weeds, in particular Cape tulip, can be found on the PIRSA website:

Common Garden Escapees on KI

Background

Kangaroo Island is unique in that our towns and homes are surrounded by bushland. Many garden plants, even those that are native to other parts of Australia, can spread into the bush where they can out-compete our native plants and change the habitat, making it less suitable for our native animals.

If you have any of these plants in your garden, please remove, or control the spread of seedlings. Do not dump garden waste in the scrub. Garden waste can be taken direct to the KI Council Dump, or 'solarised' (see below).

The KI Landscape Board grows a variety of plants native to KI which can be grown in place of the weedy species listed in this brochure. These plants grow successfully in our local conditions, won't become weedy and will make a beautiful feature in your garden.

This article is a collaboration of work between the Parndana Progress Association, Department of Primary Industries and Regions (PIRSA) and KI Landscape Board, with assistance from the Department of Environment and Water and the KI Council.

Control Techniques

Spot Spray

Using knapsack sprayer, spray herbicide to coat every leaf. Be careful of spray drifts. Add a wetter agent (e.g. Pulse) to herbicide to help leaf penetration at 10 ml per 10 L.

Solarising

Place all parts of plant into triple-lined, thick garbage bag and leave in sun for 1 month. Dispose in general waste, not green bin.

Manual Removal

Remove all plants, roots/tubers from ground. Leave with roots up, or place in green bin.

Cut & Swab

Cut stem/trunk low to the ground and apply herbicide immediately with dabber/ paint brush at specified concentration.

African Weed Orchid
Disa bracteata

Appearance: Orchid sprouting from underground bulb in late winter. Sword-like leaves green with red tinge. Many small, hooded cream-pink-red flowers grow up stem. Fine seeds spread by wind. Also spreads by underground bulbs.

Impact: Invades bushland and out competes ground flora like orchids.

Control: Manual removal before seeding, ensuring entire bulb is collected. Solarise. Spot spray with 100mL glyphosate (360g/L) per 10L water.

Arum lily
Zantedeschia aethipica

Appearance: Large lily to 1m tall with long, dark green, fleshy leaves. Large, white, funnel-shaped flowers with yellow centre in spring. Spreads by seeds and fleshy roots with extensive tubers.

Impact: Toxic to humans and livestock. Smothers native plants.

Control: Cut & swab with 10-50mL glyphosate (360g/L) per 1L water or 0.05-0.1g metsulfuron-methyl (600g/kg) per 1L water. Manual removal; ensure removal of all bulbs.

Bluebell creeper
Billardiera heterophylla

Appearance: Evergreen climber with shiny, lance-shaped leaves. Clusters blue, pink or white flowers in summer to autumn. Fruits contain >50 seeds dispersed by birds, ants and possibly possums. N.B. there are some very similar *Billardieras* (*B. cymosa, uniflora* & *versicolor*) which are native to KI; please ensure correct identification.

Impact: Toxic to humans and livestock. Smothers native plants.

Control: Cut & swab with 10-50mL glyphosate (360g/L) per 1L water or 0.05-0.1g metsulfuron-methyl (600g/kg) per 1L water. Manual removal; ensure removal of all bulbs.


Bracelet honey-myrtle
Melaleuca armillaris

Appearance: Fast growing tree to 8m tall. Dark green, feathery foliage with white, cylindrical flower spikes in spring and summer. Numerous, tiny seeds fall near parent plants, and carried by wind and water.

Impact: Spreading canopy shades out native shrubs and prevents their growth.

Control: Cut & swab with glyphosate (450g/L) undiluted. Spot spray with 100mL glyphosate (450g/L) plus 1g metsulfuron-methyl (600g/kg) in 10L water.


Bridal creeper & bridal veil
Asparagus spp.

Appearance: Climbing vines with twining stems, emerging in cooler months. Stems grow from dense, underground, tuberous root mats. Small white-green flowers. Large fleshy fruits.

Impact: Smothers and out-competes native plants.

Control: Manual removal ensuring all rhizomes and tubers collected. Solarise. Spot spray with 100mL glyphosate (360g/L) + 0.3g metsulfuron-methyl (600g/kg) per 10L water.


Cape Leeuwin wattle
Paraserianthes lophantha

Appearance: Fast growing shrub or tree with fern-like, feathery foliage. Greenish-yellow bottlebrush flowers in winter. Ochre-coloured pods with seed dispersed by birds, slashing and garden waste.

Impact: Dense stands crowd native shrubs and prevent regeneration. Spreads rapidly after fire.

Control: Cut & swab with glyphosate (450g/L) diluted 1:10. Spot spray with 80mL glyphosate (360g/L) + 1g metsulfuron-methyl (600g/kg) per 10L water.


One-leaf Cape Tulip
Moraea flaccida

Appearance: Long, strappy leaves emerge after autumn rains. Orange-salmon-yellow flowers in spring. Underground bulb-like corm. Seed is spread by wind, water or soil.

Impact: Toxic to grazing animals. Invades agricultural lands and open areas of native vegetation.

Control: Spot spray with 80mL glyphosate (450g/L) + 0.5g metsulfuron-methyl (600g/kg) per 10L water. Manual removal before seeding, ensure corm is removed, solarise.


Coastal tea-tree
Leptospermum laevigatum

Appearance: Tall shrub to 6m. Grey-green, flat, stiff leaves, with rounded tips and numerous white flowers. Woody capsules shed many tiny seeds spread by wind, water, human planting and garden waste.

Impact: Drought tolerant, forming dense thickets that eliminate other native plants.

Control: Spot spray (seedlings) 100mL glyphosate (450g/L) in 10L water. Cut & Swab with 100mL triclopyr (600g/L) in 3L diesel.


Gazania
Gazania spp.

Appearance: Perennial daisy to 30cm tall, forming clumps and dense mats of vegetation. Long, slender green leaves with white, hairy undersides. Yellow-orange-pink daisy-shaped flowers produce an abundance of seed. Seeds spread through wind, water and garden waste.

Impact: Dense stands rapidly out-compete native plants.

Control: Spot spray with 100mL glyphosate (360g/L) per 10L water.

Mirror bush

Coprosma repens

Appearance: Low-growing shrub or tree with thick, glossy, oval leaves with curved edges. Egg-shaped orange-red berries or small, inconspicuous pale green-whitish flowers in clusters in fork of the leaf. Seed is dispersed by birds, animals and garden waste.

Impact: Forms dense clumps which prevent native plant growth.

Control: Manual removal ensure all roots removed. Cut & swab with glyphosate (450g/L) undiluted.

Polygala

Polygala myrtifolia

Appearance: Dense, evergreen shrub to 4m tall. Oblong to oval shaped leaves with purple and white pea flowers. Green fruit develop to heart-shaped pods and release two seeds spread by birds, water and ants.

Impact: Spreads through, and dominates, native plant understorey.

Control: Cut & swab with Vigilant II® undiluted gel. Spot spray with 100mL glyphosate (450g/L) per 10L water. Manual removal.

Sallow wattle

Acacia longifolia var. *longifolia*

Appearance: Fast growing tree 2-8m tall, with yellow wattle spikes in winter and spring. Seed dispersed by birds and ants, and through slashing, soil and garden waste. Looks very similar to coastal wattle (*A. longifolia* var. *sophorae*) which only grows naturally near the coast on KI. The weed species has longer leaves with a pointed tip.

Impact: Dense stands prevent native plant germination. Has invaded roadsides.

Control: Cut & swab with glyphosate (360g/L) diluted 1:2 with water.

Sweet Pittosporum

Pittosporum undulatum

Appearance: Evergreen tree 5-20m tall with shiny, dark green leaves with wavy edges. Clusters of creamy-white fragrant flowers. Fleshy, orange berries split to reveal many sticky seeds dispersed by birds, possibly possums and in garden waste.

Impact: Dense foliage shades native shrubs and prevents regeneration.

Control: Cut & swab with glyphosate (450g/L) undiluted or Vigilant II® undiluted gel.

Watsonia

Watsonia meriana var. *bulbillifera*

Appearance: Winter growing bulb forming thickets of tall, sword-like leaves and a 2m tall flowering stem. Orange, tubular flowers in spring to summer. Corms spread by water, slashing and garden waste.

Impact: Forms dense clumps that prevent native plants germinating.

Control: Spot spray with 100mL glyphosate (360g/L) + 0.3g metsulfuron-methyl (600g/kg) per 10L water. Manual removal Dig up corms, solarise.

Further Information

PIRSA Kingscote

P 8553 4949

Further information on these and other weeds can be found on the PIRSA website:

Photo Credits

Images courtesy; Colin Wilson, Brisbane City Council, KI Landscape Board, K. C. Richardson, Neal Kramer, PIRSA, San Marcos, Rob & Fiona Richardson, R. Randall, Sheldon Navie, Wikipedia, Weeds of Melbourne.

Update: KI Feral Pig Eradication

Update after Autumn '22 Thermal Assisted Aerial Cull

Background

The 2019-20 summer fires devastated Kangaroo Island. A silver lining to emerge from this devastation was a once in a lifetime opportunity to eradicate feral pigs from the island while their numbers were low, and the vegetation was recovering.

In 2017, feral pigs cost Kangaroo Island producers about $1 million. Feral pigs damage pasture and farm infrastructure as well as spreading diseases. Removing feral pigs will eliminate these costs and reduce impacts on the recovering biodiversity, including many threatened plants and animals.

What's being done

The PIRSA-led Kangaroo Island Feral Pig Eradication, in partnership with the KI Landscape Board and KI National Parks and Wildlife Service, is entering its final year. The program has culled 840 feral pigs since 2020, and there are less than 100 feral pigs estimated to remain across the island.

The project team is using the latest technology in control tools to achieve eradication, including:

- Remotely triggered traps
- HOGGONE® sodium nitrite-based poison baits
- Thermal ground shooting
- Thermally Assisted Aerial Culling (TAAC)
- Artificial Intelligent (AI) 4G camera traps

TAAC is the newest and most exciting technology adopted by the program. A military grade thermal camera is carried in a helicopter to detect feral pig heat signatures, and a laser is then used to guide the airborne marksmen to the target, which is then swiftly and humanely destroyed.

The recently completed Autumn '22 TAAC operation flew 43 hours covering the waterways across Western KI and culled 25 feral pigs. This is the third of a total of five TAAC operations planned for the eradication. A similar aerial cull this time last year culled 126 feral pigs in only 36 hours across the same area. The decreasing number of feral pigs is a promising sign, and the majority of the 25 feral pigs culled were lone animals rather than mobs of pigs with piglets at foot.

The aerial cull was flown by HeliSurveys Pty Ltd, and Brenton Florance from the KI Landscape Board was the lead aerial marksman throughout the cull. The effort being expended per pig is now exponentially increasing, indicating that eradication is close to success. Two more TAAC's are planned for the end of the program, one in Winter of 2022, and a final one in Autumn 2023.

To help in the search for the last remaining pigs, an artificially Intelligent (AI) 4G camera network is being deployed. Motion sensing cameras with solar panels and aerials are placed in known feral pig hotspots and watering points. These cameras are fully automated and will take images of any movement detected. The images are then processed by AI software called eVorta. If a feral pig is detected in the photo, eVorta highlights the feral pigs, and sends an alert immediately to ground staff, who can then control the feral pigs in real time.

Funding is secured to increase the AI camera network to over 300 cameras across the entire west end of the island, allowing staff to monitor for feral pigs over greater areas with ease, and allowing rapid response to feral pig detections in real time.

Results

With these new control and monitoring tools in the arsenal, the program is on track to achieve eradication of feral pigs from the island by June 2023.

Figure 4: An eVorta connected 4G motion sensor camera, set up with long range antenna and solar battery pack allowing for constant operation.

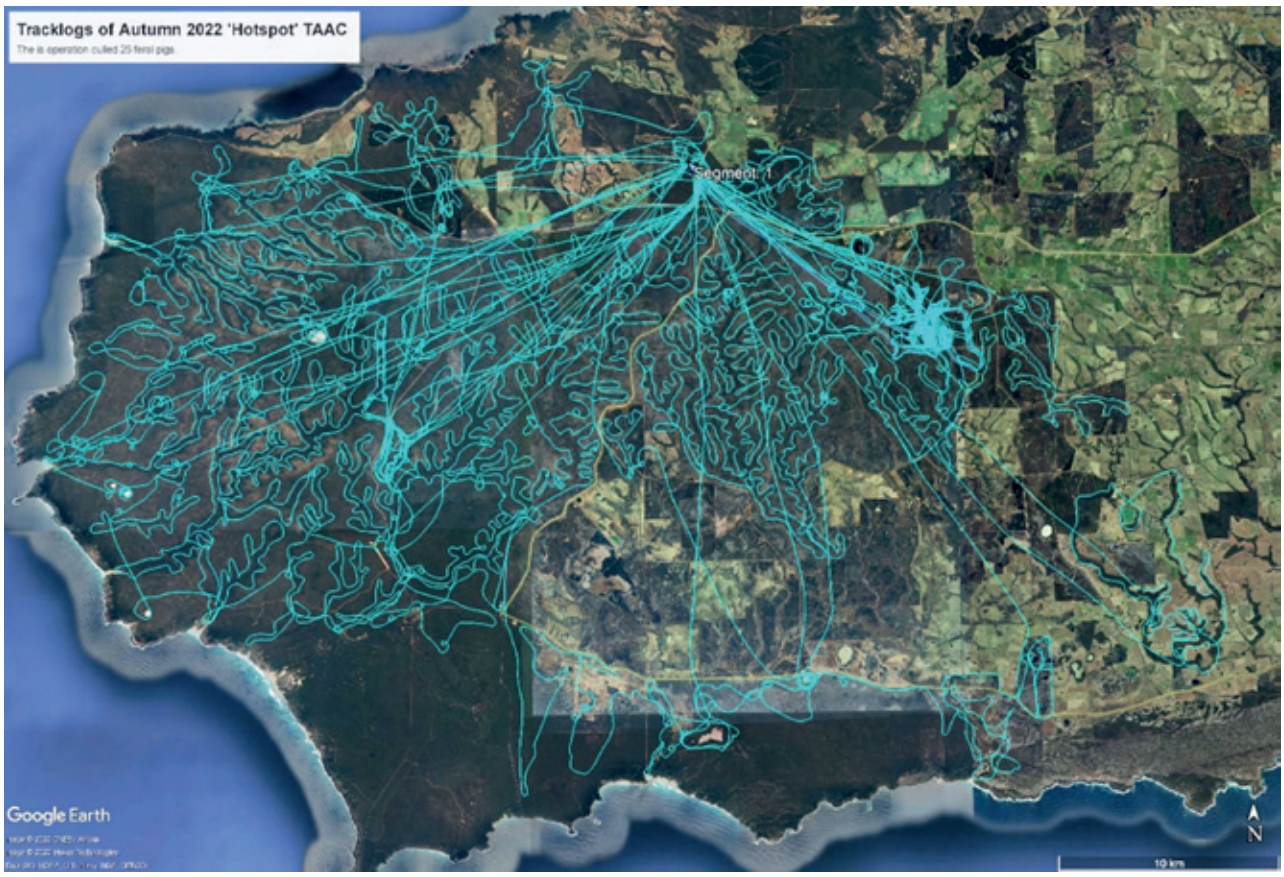

Figure 2: Map of tracklogs from the recent Autumn 2022 aerial cull, which flew along creeks and waterways in parks and plantations, and removed 25 feral pigs.

Figure 3: This mob of 15 pigs (2 sows and 13 piglets) were detected on camera by the eVorta Artificial Intelligent software, and quickly destroyed by project staff.

Figure 4: The Autumn 2022 Thermal Aerial Culling Team about to take off, visible are Brenton Florance (left), and Tyrone Fitzgerald (right).

Funding/Sponsors

- **The KI Feral Pig Eradication is funded by the South Australian and Australian Government Disaster Rebuilding and Resilience Program.**

Further Information

To report pig sightings please call:

Matt Korcz, KI Feral Pig Coordinator

P 8429 3560 M 0438 117 513
E Matt.Korcz@sa.gov.au

Visit the PIRSA website to find out more:

Bat Survey and Trapping on KI

Background

We started the survey of the bats of KI in December 2019, and alas lost our (borrowed!) bat detectors in the bushfires. We obtained grant funding to purchase more bat detectors based on the importance of learning more about KI bats. Very little is known about the bats of the island, and some could be sub-species unique to KI. In addition, it is important to ascertain the impact the bushfires have had on bat populations.

All our bats are insectivorous; they eat huge numbers of invertebrates (including moths, flies and mosquitoes) each night and have important ecosystem functions. We have a special interest in determining the role of bats in agricultural production.

Bat activity from sound files

As we continue to monitor bats acoustically at a few of our 97 sites across the island, additional evidence shows that more than the 7 species known to exist on KI occur. Research partner MB Stonor has so far identified bats from 161 of 640 nights (25%) of data, manually. Some nights have over 10,000 sound files, which must be examined individually, so it is quite an achievement. We have not yet analysed the data, but bat activity seems low in many places. Unfortunately, bat numbers cannot be determined from the numbers of sound files.

Bat trapping

The abundance of dams means that bats do not concentrate at a single water point, and catching a bat represents more work than finding a needle in a haystack. We only trapped 8 bats, all released on site after measurements and collection of a wing punch for DNA. They consisted of lesser long-eared bats and possibly two species of forest bats (very difficult to differentiate visually; see Figure 1). We are planning to trap again next summer.

Figure 1: Forest bat captured this summer at Pelican Lagoon (Photo by MB Stonor)

Example of bat work at a farm on the Harriet River

Despite valiant efforts by awesome bat trappers Aedan and Venetia Bolwell, we were unsuccessful in trapping at this site. Bats that obviously live in the beautiful riparian vegetation teased us by flying around at dusk, and then left for undisclosed locations (pattern observed at all sites). The acoustic files examined so far show that all known bat species (and more) were at the river site 25 and 26 January 2020, immediately after the bushfires, but 26 January 2021 and 27 December 2021, the white-striped freetail bat and the southern freetail bats were missing. Bat activity across years cannot be compared from just one night, but on the same nights, it was always higher at the river site than at the small remnant vegetation site surrounded by paddocks, which also had fewer species.

The work continues all over the island, including in parallel an evaluation of the role of nest boxes for bats in bushfire recovery (with volunteer coordinator Peter Hammond).

We would like to thank our volunteers for their contribution to this project.

Funding/Sponsors

Partners, nest box project (with volunteer coordinator Peter Hammond): KI Conservation Landowners Association, KI Wildlife Network, KI Research Station, KI Dance School, Friends of Parks KI Western District, University of South Australia, and many fabulous landholders.

Funding: Lirabenda Endowment Fund Grant, University of South Australia's Vice Chancellor's Fund for KI, Foundation for National Parks & Wildlife, WIRES-Landcare, Nature Foundation Wildlife Recovery Fund, Landcare Led Bushfire Recovery Grant, Albert & Barbara Tucker Foundation, Patagonia. Note: all the work is volunteered.

Further Information

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Visit the KI Research Centre website to find out more: