

Drought and Climate Resilient Sheep Farms and Landscapes

Project Leads: Associate Professor William van Wettere (Adelaide University) and Associate Professor Andrew Thompson (Murdoch University).

Project Overview & Aim

Profitability of farming in low rainfall areas (200-400 mm) is on the decline due to the negative impacts of drought and heat on pasture growth, soil stability, and sheep performance. Starting in June 2025 and running until October 2030 this project will combine climate- and drought-resilient sheep with drought-tolerant pastures, shrubs, and trees with the aim of stabilising landscapes, improving feed consistency, enhancing microclimates for sheep, and improving sheep welfare and productivity.

The project is managed by Adelaide University and Murdoch University, alongside collaboration with the South Australian Drought Hub, Grower Group Alliance, Livestock SA, nine farming systems groups, neXtgen Agri, Pinion Advisory, and Red Centre Enterprises, a First Nations owned enterprise. The project consists of research and producer focused validation sites in SA, WA, VIC, and NSW.

Project Objectives:

Work with producers and producer groups to design region-specific feed base systems which:

1. Enhance consistency of feed supply,
2. Fit within or alongside cropping and pasture systems,
3. Create microclimates which improve sheep welfare and productivity,
4. Quantifiably improve landscape stability and ecosystem services.

The project will trial and demonstrate how selecting sheep with greater feed efficiency, energy reserves and heat tolerance improves enterprise resilience.

Validate the benefits of integrating climate adapted sheep with multi-purpose plantings to achieve comprehensive system and landscape resilience.

Trial Snapshot: South Australia

Within South Australia the trial consists of an investigation site at the Adelaide University Roseworthy campus and three Regional Validation Sites located in Kyancutta, Caltowie and Lamerloo to provide farmer-led trials and treatments (Figure 1).



Investigation site at Roseworthy Campus

The site is located at the Roseworthy Campus, Adelaide University, Roseworthy, South Australia. It aims to provide a controlled and replicated research environment to 1) test and identify adaptive sheep traits associated to improved heat and drought tolerance of sheep and increase their capacity to efficiently utilise a diverse feed base; and 2) compare drought resilient fodder systems incorporating legumes and shrubs with continuous cropping or current annual pastures / crops as controls. The site details are as below:

- **Total Area:** 100 ha mixed-use research site.
- **Paddock Design:** 16 × 1.75 ha paddocks. Each includes 0.4 ha protected for multi-storey feed base systems. Each can be split into two sub-paddocks.
- **Additional Land Use:** 32 ha small paddocks (including 10 ha with established trees). Plus 40 ha of cropping land (1–2 paddocks).
- **Livestock:** Genome-sequenced Merino flock, and Hair sheep flock (mixed breeds).
- **Research Focus Areas:** Heat and Drought resilience and resistance, fertility, grazing behaviour, body composition, immune function.
- **Feed Base Planting Design:** Informed by ENRICH data, local knowledge, and First Nations input. Demonstration site for planting options and species.
- **Research Capability:** Enables detailed phenotyping and genotyping for climate and drought resilience traits in sheep, as well as testing of novel forage systems to support livestock and landscape health and sustainability.

The first part of the trial at the Roseworthy Campus Investigation site involved planting four different planting treatments consisting of (shown in Figure 2):

1. Control (no trees or shrubs added)
2. Treatment 1: High palatability trees + shrubs
3. Treatment 2: Low/Medium palatability trees + shrubs
4. Treatment 3: First Nations family trees + shrubs

The next steps for the trial site are shown in Figure 3 with the highlighted yellow paddocks to be next paddocks planted in 2026.

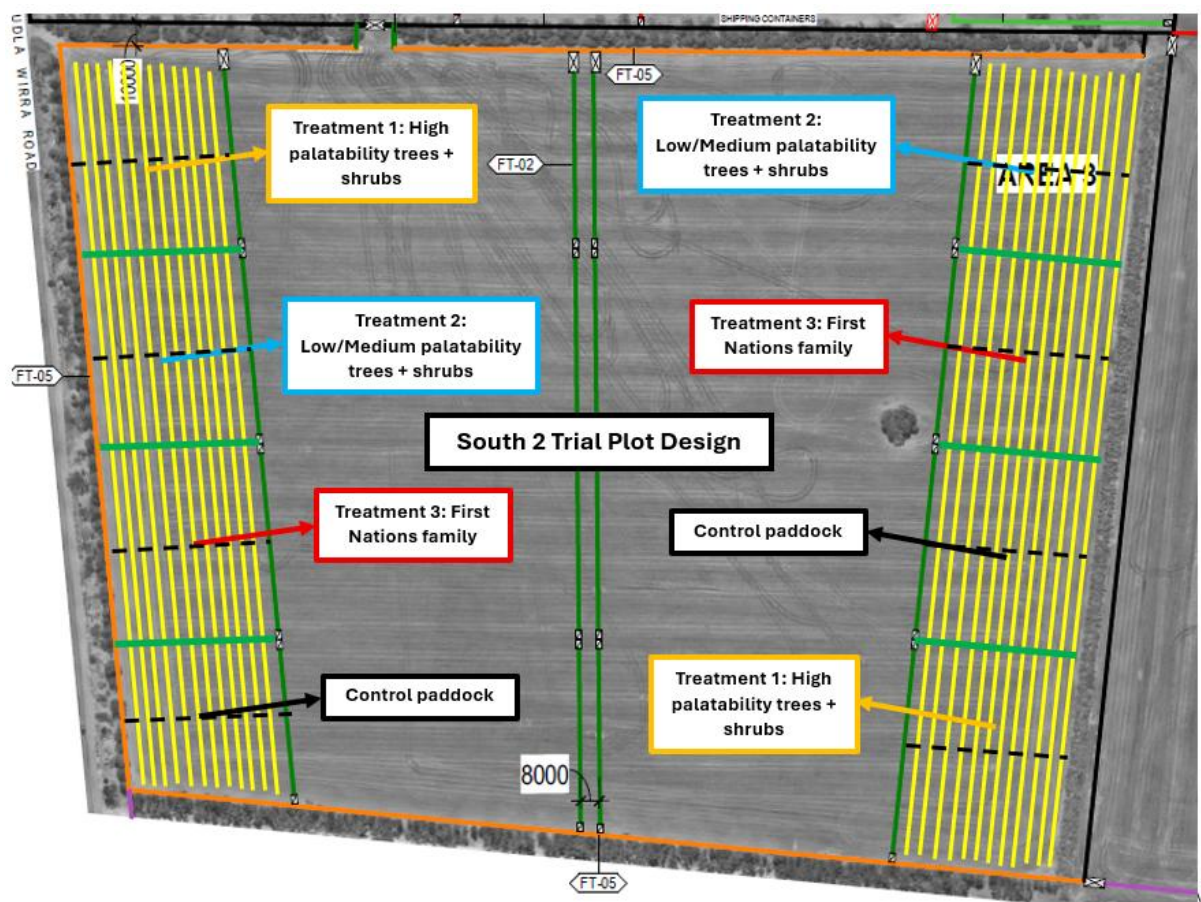


Figure 2: Trial plot design detailing the different treatment groups at one of the intensive paddock sites at Roseworthy Campus. Yellow lines = Rows where species were planted. Green lines = Permanent fencing. Black dotted lines = Semi-permanent fencing to be put in place to increase replication of treatment groups.

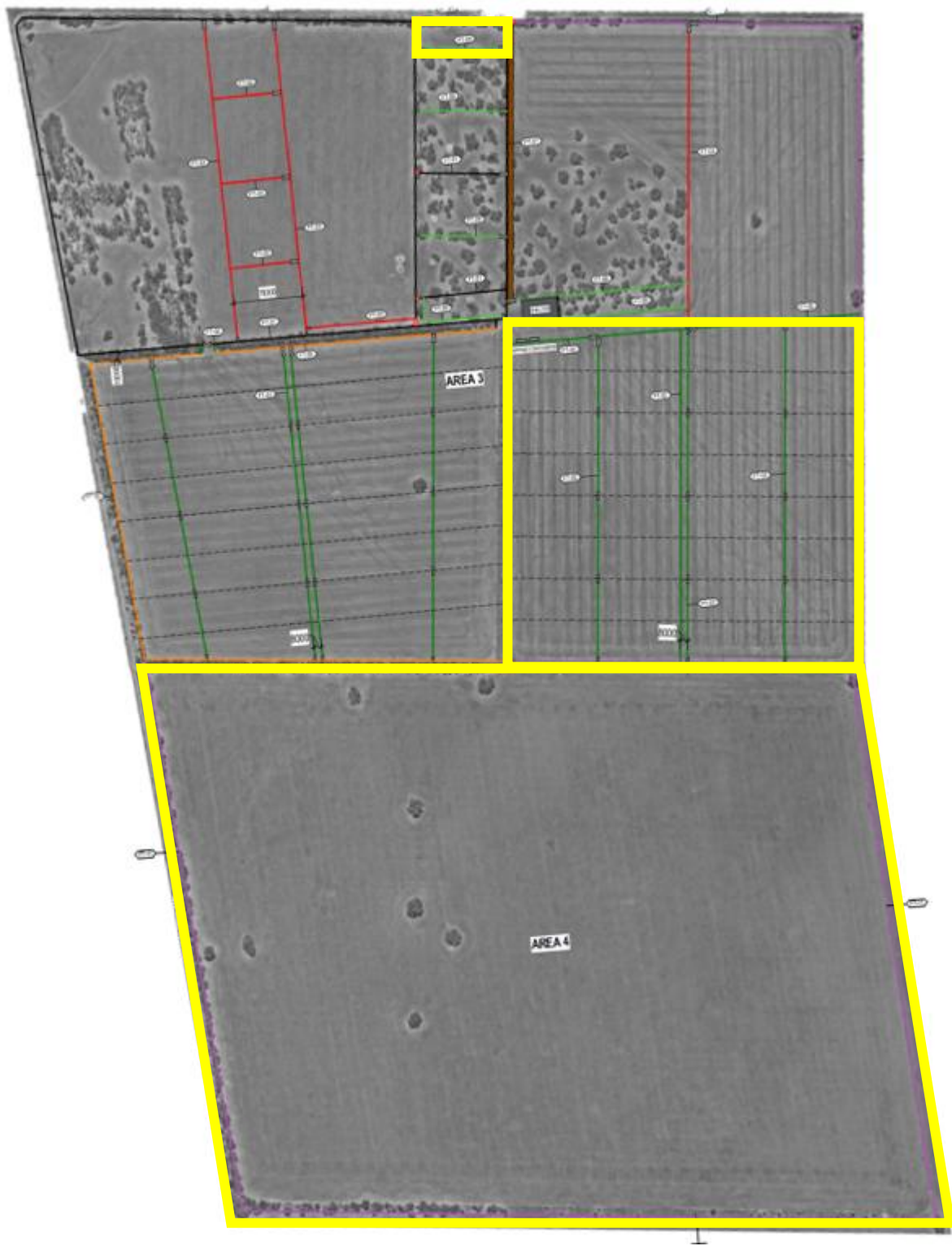


Figure 3: Long Term Trial site, with additional planting sites for 2026 highlighted in yellow.

Regional Validation Sites:

There are three Regional Validation Sites within South Australia; located in Kyancutta, Caltowie and Lamerloo. In October of 2025 planting started at two of the regional sites in the Upper North and the Mallee, after discussions with each producer about the type of plants and outcomes they were after (e.g. shade and shelter for joining / lambing, alternative food source). The plant species were similar to the ones from the Roseworthy Investigation site but adapted to suit the specific region and aims of the producer. Further planting will occur in 2026 at the Regional Validation sites as well as soil testing, Natural Capital Data collection, and sheep measures (weight, BCS, genotyping, phenotyping and reproductive outcomes).

The project will have a range of Adoption, Extension and Communication activities consisting of:

- Field days and interactive demonstrations will showcase adaptation practices and system benefits.
- Regional workshops and small advisory sessions will support farmers and advisors to implement and scale solutions.
- Case studies and factsheets will be developed with farming systems groups and promoted through rural networks.
- Scientific publications, presentations, and media releases will communicate outcomes to researchers, advisors, and farmers.
- Trial sites will enable facilitated, peer-to-peer learning and practical demonstrations (e.g. seed harvesting and establishment techniques).
- Farm system modelling combined with farmer experience will support adaptation across different agro-ecological zones.
- Legacy trial sites will allow ongoing monitoring and empower farmers to address future climate challenges.

To get more information or if you have questions?

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Future
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Photos:

From left to right: Billie-Jaye Brougham (Adelaide University), Alison Henderson (Hendowie Poll Merinos) and Megan Tscharke (Adelaide University) at our Upper North site for the Long Term Trial.



Billie-Jaye Brougham and Rachel Trengrove (Upper North Farming Systems) installing tree guards over planted species at the Upper North site. Tree guards are critical for protection from harsh environmental conditions (i.e. wind) and pests during the initial seedling stage of the plants, as this is the period they are most vulnerable.



Russell Meade and Megan Tschärke (Adelaide University), and Minnie, preparing for installation of Sentek Soil Probes in the South 2 Trial site at Roseworthy Campus. Soil probes will be used to monitor soil health measures, specifically pH, salinity, temperature and moisture.



Kate Delaporte (Adelaide University) preparing Tagasaste seedlings into individual seedling pots for intensive growth at Waite Campus. Kate brings extensive expertise in Australian flora and collaborates with Red Centre Enterprises, a First Nations-owned enterprise that will provide key advisory support for the establishment of multi-species plantings and landscape systems.



Plants growing well at the Roseworthy Campus Investigation Site.



Megan Tscharke (Adelaide University) at the Roseworthy Campus Investigation Site ready to plant. A total of 1800 plants were put in over two days thanks to many helpers.

