



Department of
Primary Industries and
Regional Development

Protect
Grow
Innovate

Journey to Carbon Neutral – using the Katanning Research Station as a living laboratory

Western Australia

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Carbon Neutral 2030 – Katanning Research Station

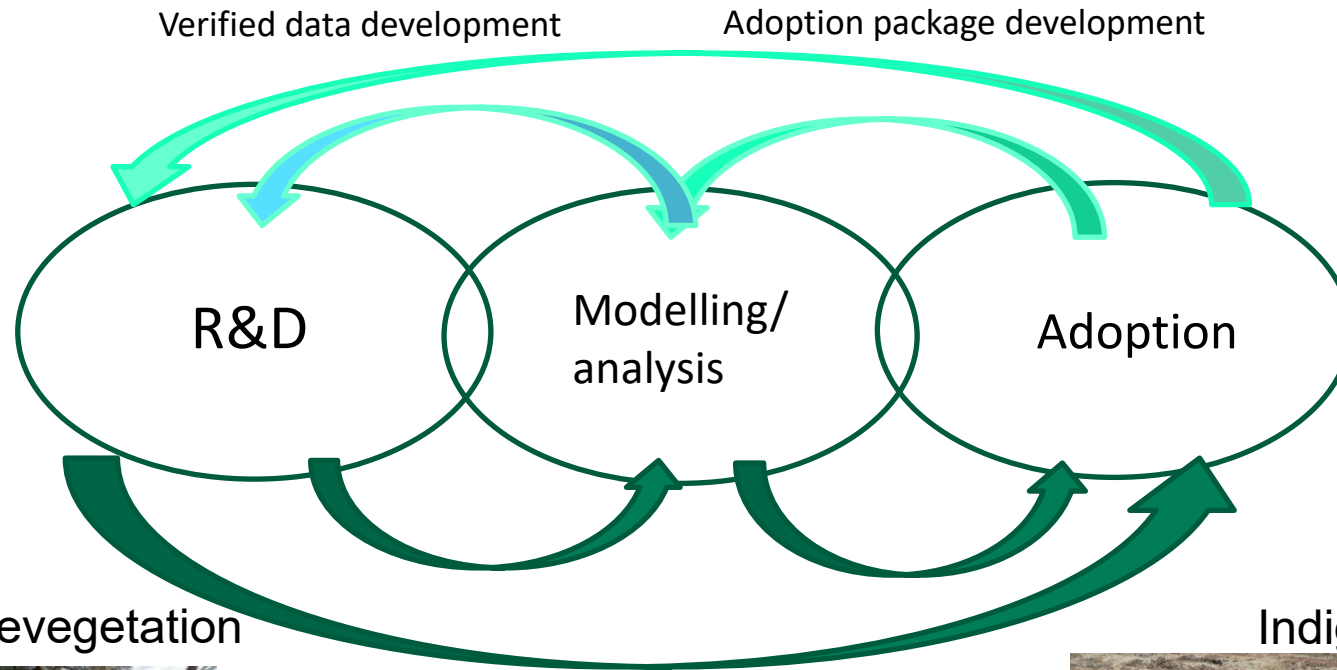
The station has been set up as a Living Laboratory to trial and demonstrate whole-farm systems change supporting reduction of greenhouse gas emissions and increasing the sustainability and resilience of the farming ecosystem.

1. Achieve Carbon Neutrality by 2030
2. Use the farm to demonstrate ready to adopt carbon mitigation practices and technologies
3. Research ground-breaking opportunities for broadacre farms
4. Develop low carbon farming systems that are sustainable and profitable
5. Deliver information, tools and adoption support for broadacre producers to achieve a low/zero emissions enterprise

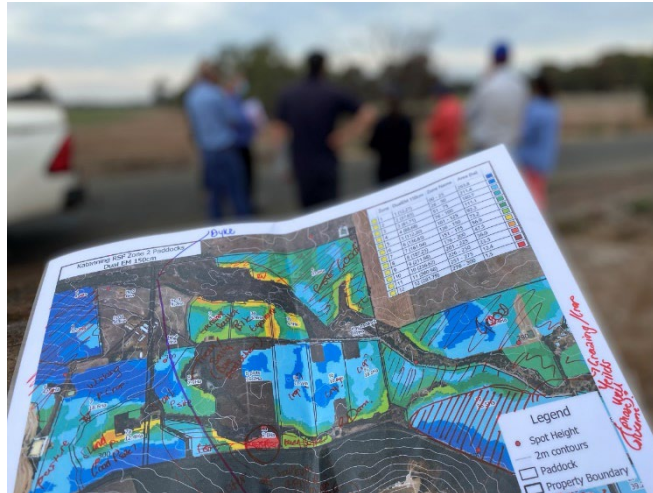
We work on the principle that if we can or can't make it work in a commercial setting, farmers get to see that.

This provides opportunities for both farmers and scientists to work together to build a practical and profitable system that supports a better farming environment and quality food and fibre.

Living Laboratory System Design



Farmers helping design revegetation



Indigenous tree planting crew



Katanning – a mixed sheep and grain farm

Katanning Research Station is a 2000 hectare dryland grazing and grain cropping farm in south-west Australia (Mediterranean climate) which is run as a commercial farming operation.

7000 head of Merino sheep

Grains in rotation with pasture (50:50)

- *Lupins*
- *Barley*
- *Canola*
- *Wheat*
- *Oaten hay*

Host of major genetic resource flock for hard-to-identify traits

Methane and feed intake facility (200 head)

Breeding for flystrike and worm resistance

10% natural vegetation and plantings

Salinity, acidity and non-wetting soil issues



Katanning Research Station Baseline Emissions

Emission intensity by land area

~1.5t CO₂ e- per arable/grazed hectare per year

Proportion of emissions from Livestock activities

76% plus a portion of other services

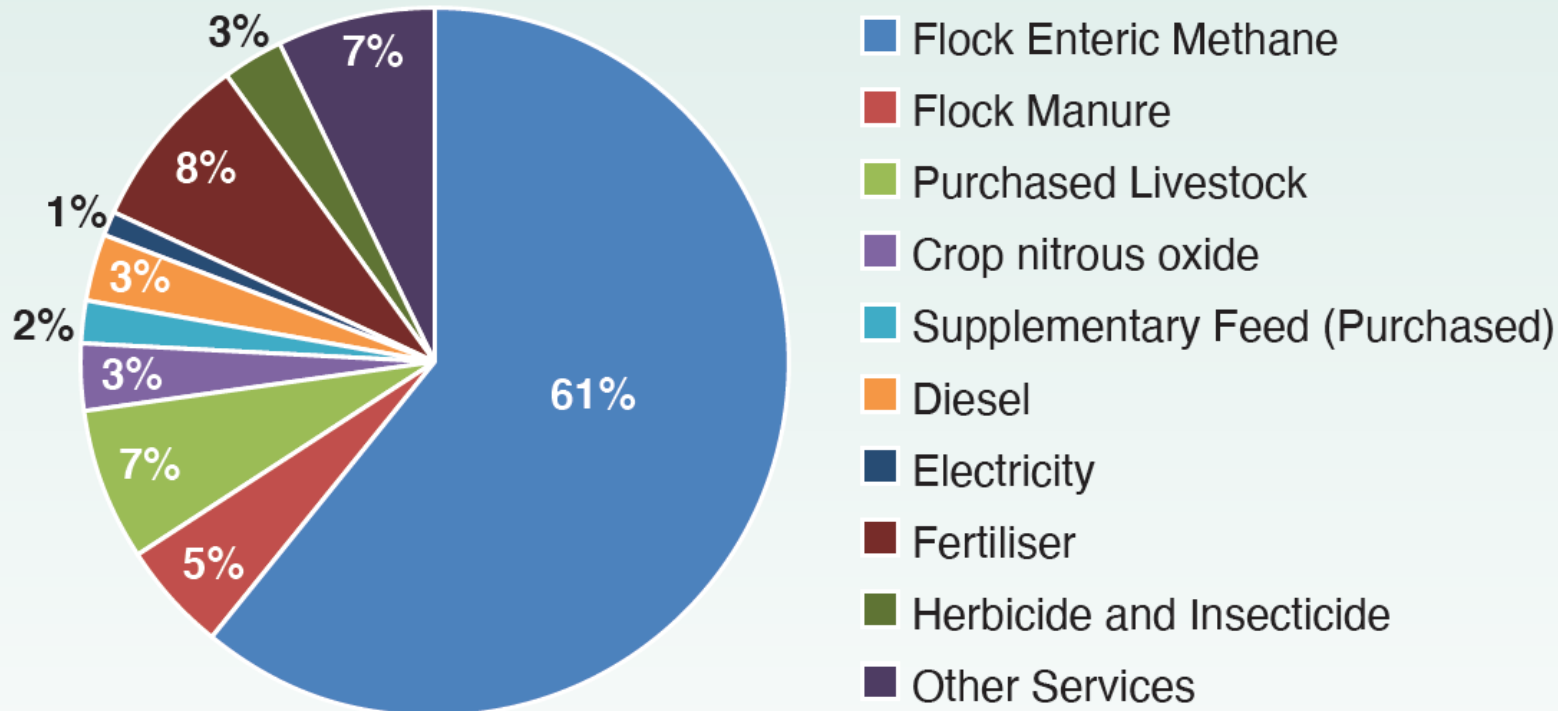
2018

2406
tonnes of CO₂ e

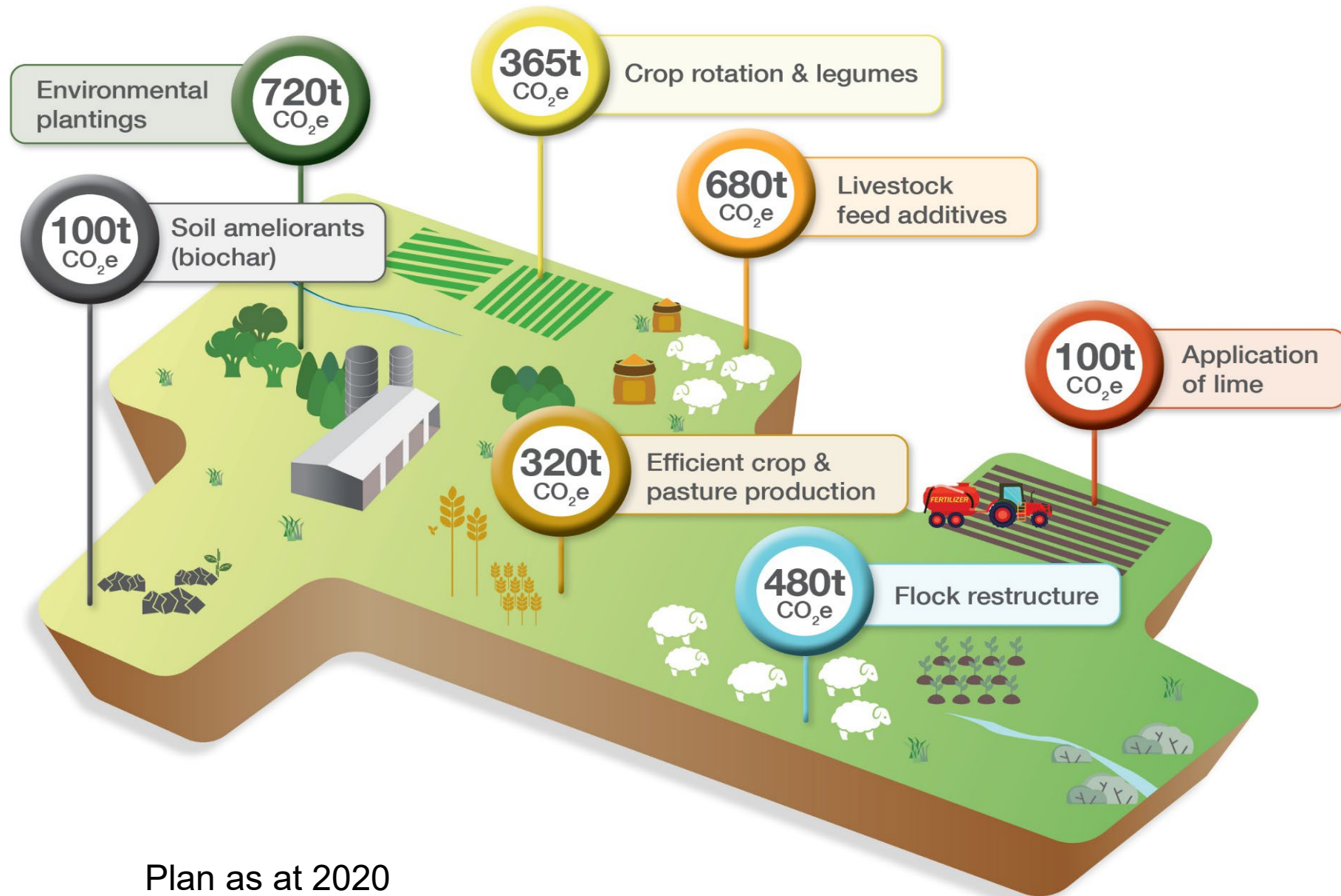
2019

2553
tonnes of CO₂ e

Emission sources



Sequestration & mitigation potential for KRS to reach CN by 2030



How are we doing so far?

Saltland –

- Grazed saltbush generates 0.70 - 2.1 t C/ha/yr, 88ha planted and assumed grazed heavily, could generate 185t C/yr
- Not included is likely reduction in sheep supplementary feed over summer/autumn (currently 50t CO₂ e/yr)
- Increased soil carbon on Saltland – possible 2t CO₂ e/ha to generate 160t CO₂ e total

Revegetation (mixed species) –

- 40ha planted on non-arable area with suitable species ~6-8t C/ha - could generate 290-320t CO₂ e/yr

Sheep Flock -

- Reduction of 10% giving 200t CO₂ e/yr reduction if maintained

Electricity –

- If can reduce grid power by 50% then saving of 12t CO₂ e per year (but lots of \$s)

Added Natural Capital benefits



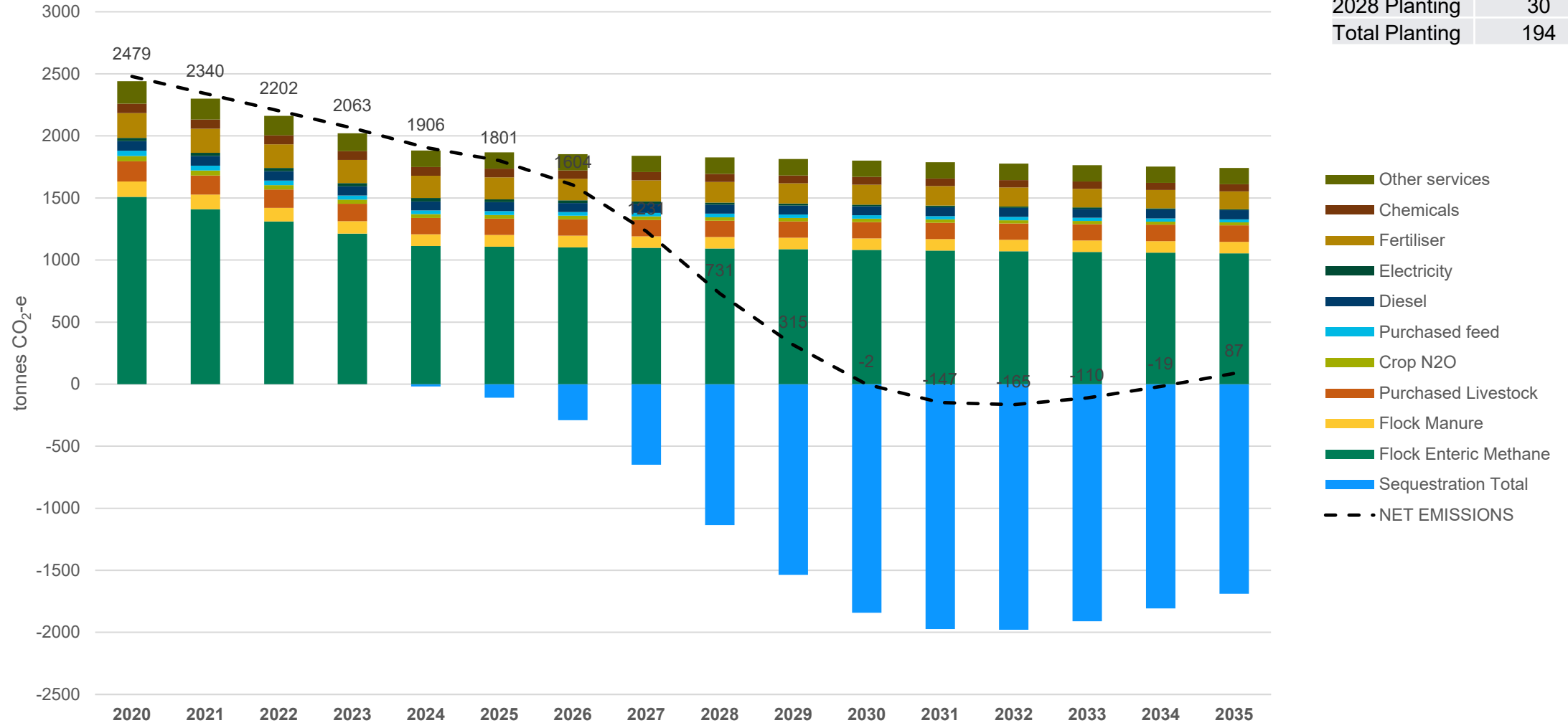
Major planting areas targeting saline and non-arable land, connecting revegetation with native forest areas for wildlife and biodiversity enhancement



Mixed legume (biserrula and serradella) pastures in rotation with barley (year in – year out)

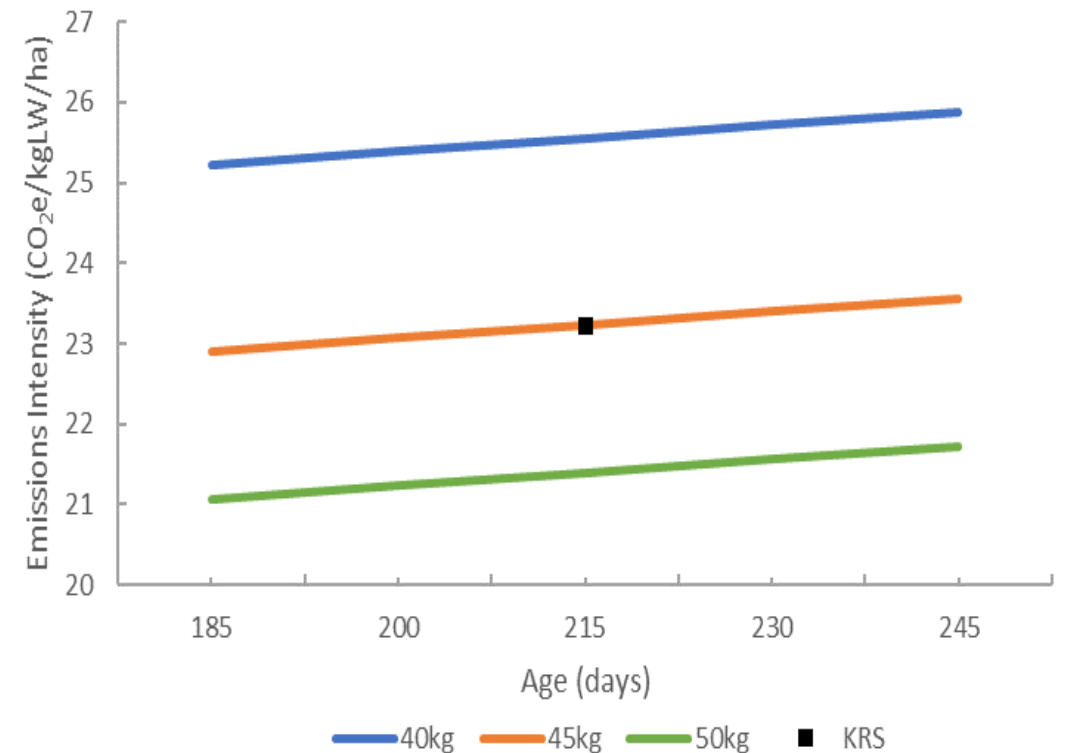
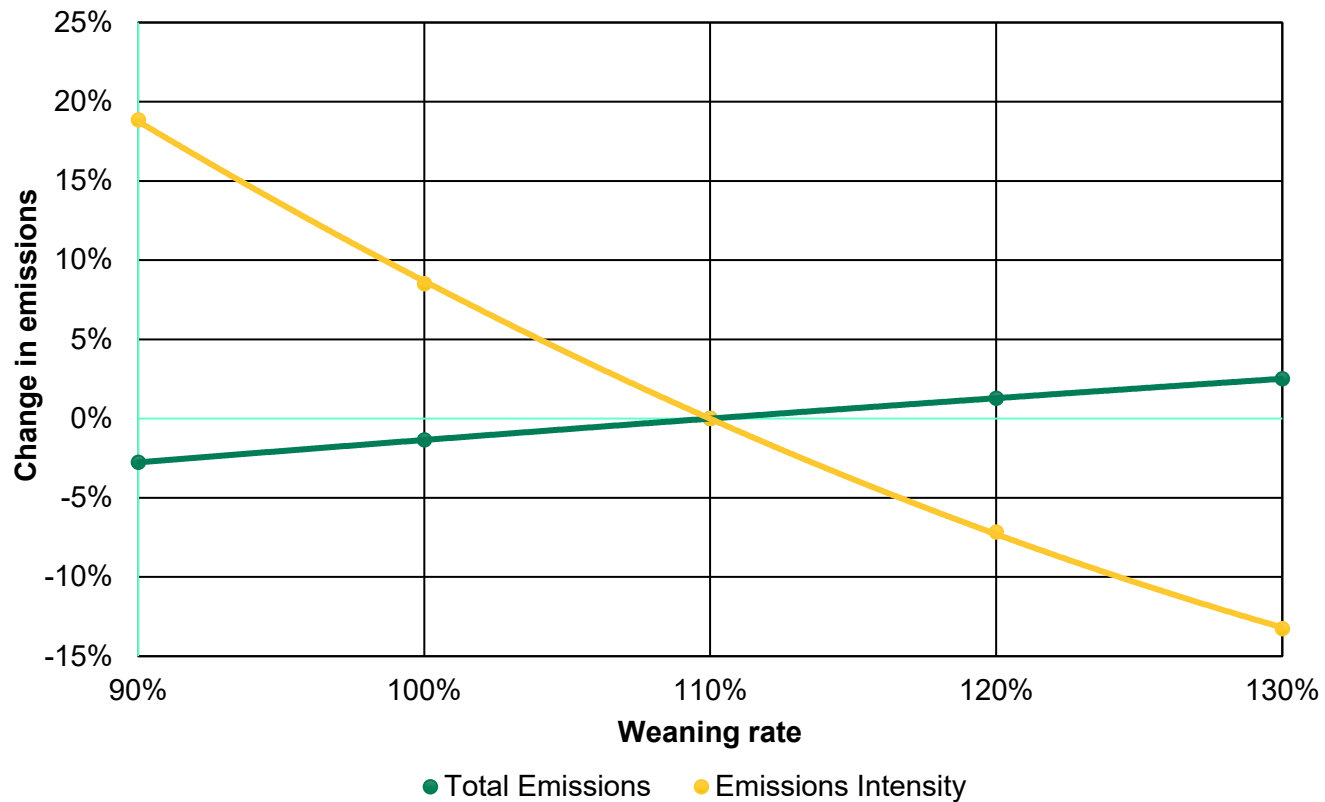
Katanning Research Station - Net Zero Pathway

	Area (ha)
2024 Planting	14
2025 Planting	60
2026 Planting	60
2027 Planting	30
2028 Planting	30
Total Planting	194



Sheep Efficiency Scenarios – messages for farmers

- As weaning rate goes up, so does total emissions (10% from 90% to 130%)
- But emissions intensity (t CO₂e per t of lwt) goes down.
- As age at turn off increases, so do emissions
- Higher weight at turn off (for the same age) gives lower emissions intensity of lamb



Living Laboratories and successful adoption

1. Producers want to see recommendations and results that fit their farming system
2. They are interested in research results and are keen to ask research questions – these can be the best questions we need to answer
3. Modelling and scenario examples with \$s if possible are useful for application on each farm
4. As farming is an integrated system these scenarios need to fit across the farm business
5. Having the living laboratory reflect current practices and farm enterprises is important
6. Scale of the examples is important (10-20 sheep wont pass the credible test)
7. Have farmers present their own trial results at field days – and discuss!
8. Implementing our own recommendations is the best way to get them right!

We build in other projects such as

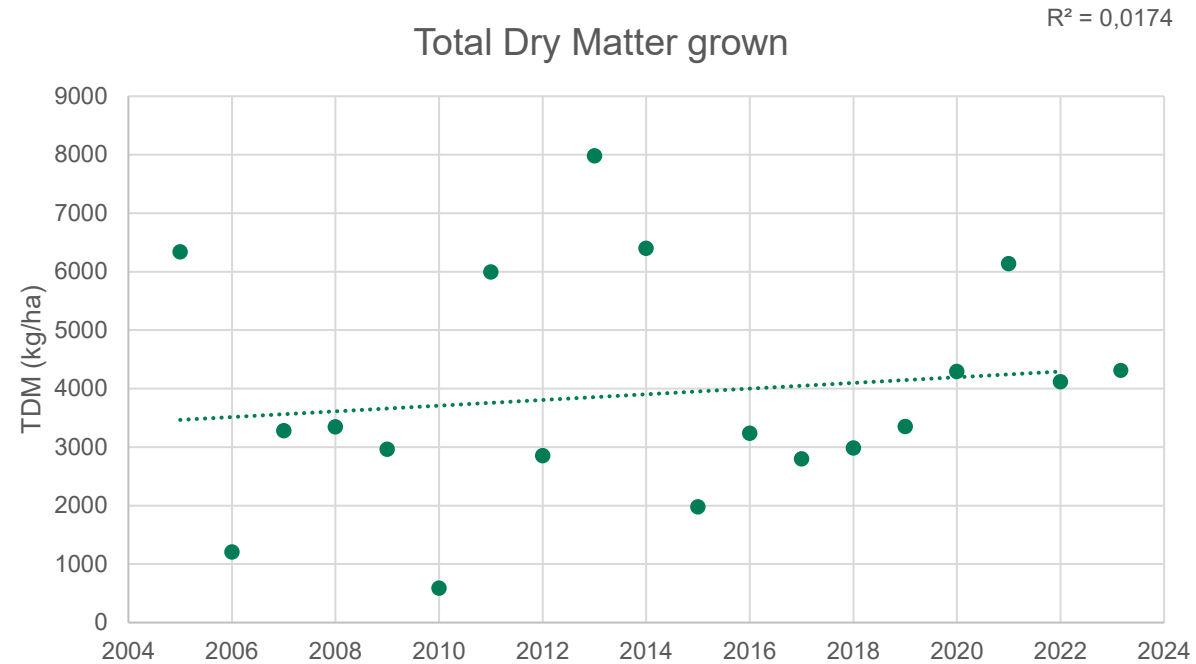
- Sheep flock sustainability in a changing climate
- Efficiency of production genetic traits
- Reducing crop production and inputs

To provide more value than just the sheep enterprise changes



Challenges for all farmers

- **Climate - variable and drying**
 - Growing vegetation for sequestration
 - Minimising inputs including sheep feed
- **High temperatures and longer dry season**
 - Degradation of SOC over summer
 - Limits on types of crops grown
 - Not suitable for perennial pastures
- **Soil type and soil quality**
 - Sandy shallow (duplex) soils – low capacity for SOC
 - Dryland salinity



WA farmers are the best!



Resilient family run farms

Science based and technology savvy

Profitable mixed farms (usually 1 animal enterprise and at least 3 crops in rotation with pasture)

Large enterprises with scale (2000 – 25,000ha)

Export focussed quality (>80% of produce is exported to more than 40 countries)

Thankyou

Visit: www.agric.wa.gov.au

Google: Katanning Research Station - Strategy to achieve carbon neutrality by 2030

Email: justin.hardy@dpird.wa.gov.au

Important disclaimer

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Research, Development and Demonstration @ KRS

- Determining the annual methane emissions from sheep on annual pasture systems in WA
- To understand the impact of new feed additives such as Asparagopsis and 3NOP in extensive grazing systems
- Research on methane emissions using forages and shrubs such as biserrula and high protein legumes
- Comprehensive soil testing to determine changes under new land use
- Impact of changing N fertiliser types, sources and application on direct N₂O emissions
- Investigate soil enhancers and manuring role in reducing emissions
- Complete regeneration of saline lands to capture carbon and impact on methane emissions
- Verification of carbon capture by revegetation and integration of vegetation in farm systems

All wrapped up in packages and tools that will allow the implications of these practices on farm emissions.