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WA Livestock Research Council

WALRC Comes to Ridgefield Study Tour Monday June 27th

A by-invitation study tour designed to showcase the collaborative extent of livestock research underway in WA and to provide leading and emerging researchers to interact with a small team of producers who are actively involved in applied research programs.

WALRC extends its thanks to Dr Tim Watts and his team at Ridgefield for hosting the event and to the research team who have gone out of their way to summarise their research for this format.

- Catering – courtesy of the Pingelly Primary School P&C
- Media capture - Lomax Media with Serena Kirby

General WALRC enquiries: Esther Price – eo@walrc.com.au

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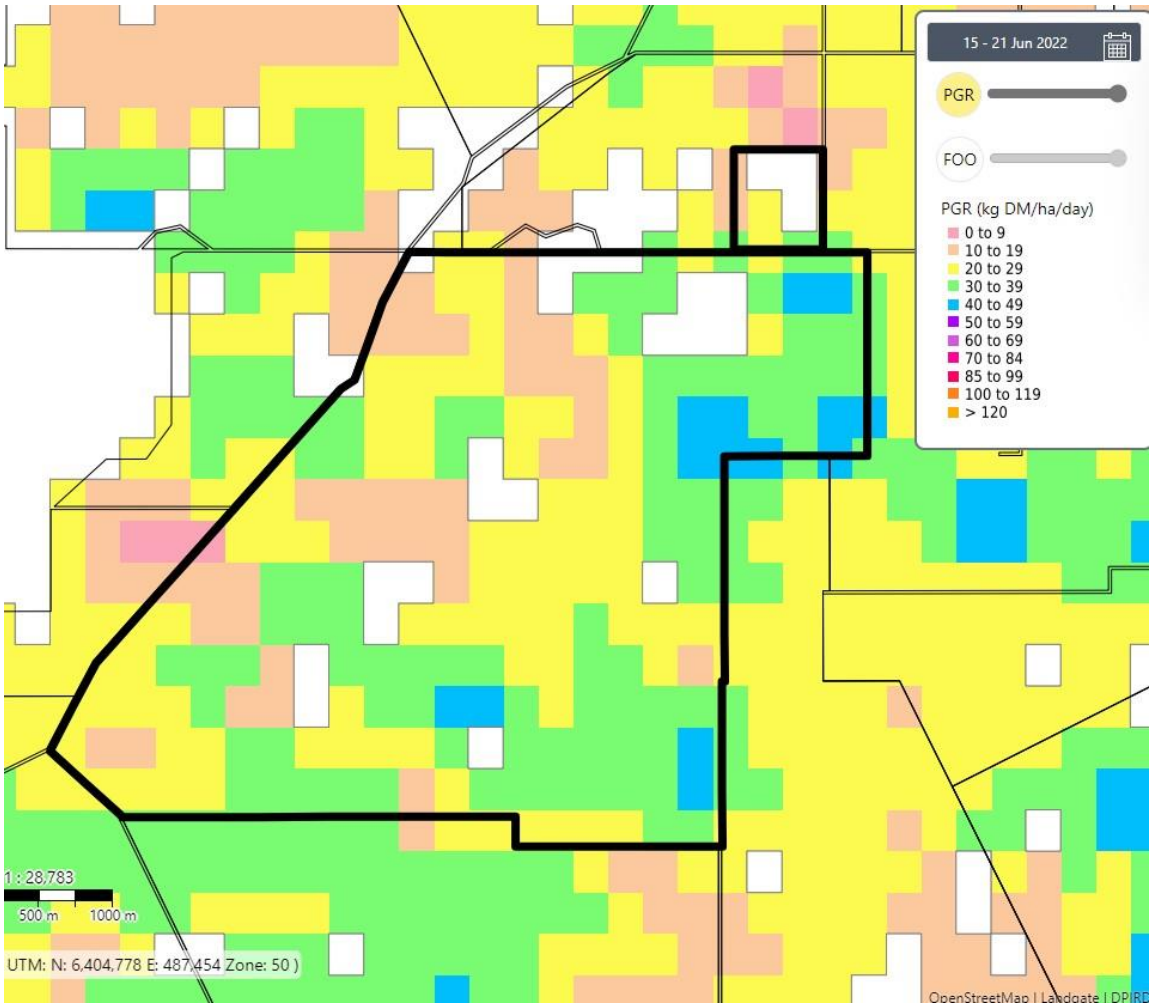
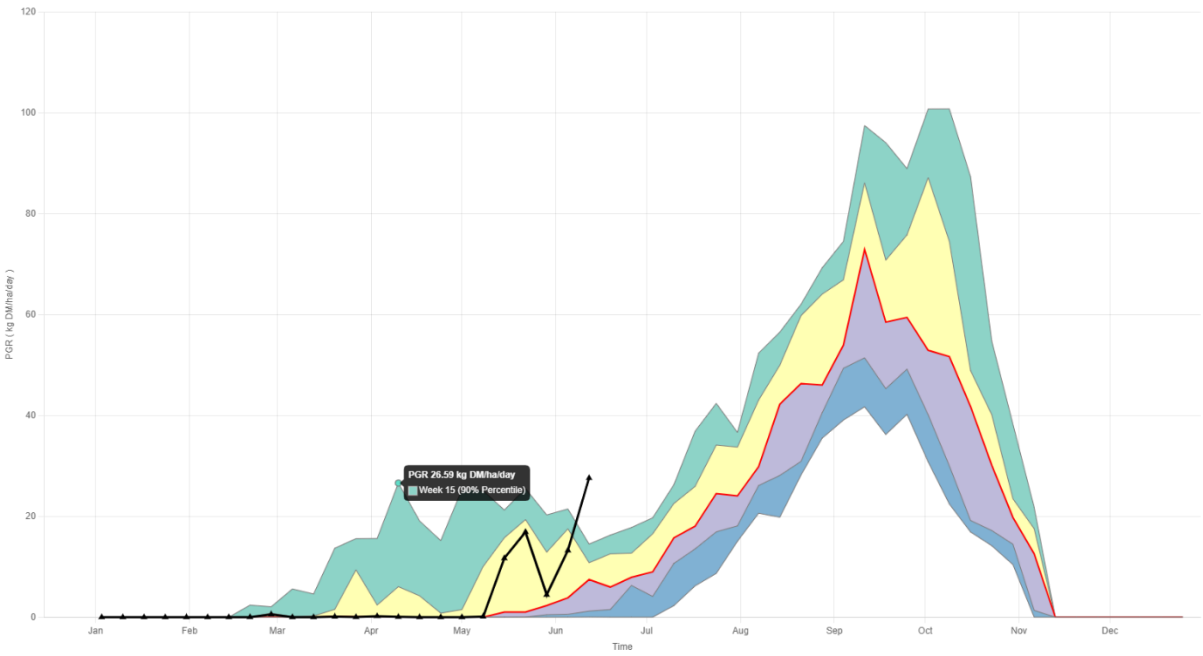
PROGRAM			
	Topic	**Speakers**	**Location**
10.00	**Welcome to Ridgefield**: Here we set the scene and the expectations of the day.	WALRC Chair **Bronwyn Clarke** with Ridgefield Farm Manager **Tim Watts**	Averys Shearing Shed
10.15	**Merino Lifetime Productivity (MLP):** The learnings from this project six years in and how they are applied on farm.	**Bronwyn Clarke**, Murdoch	Averys Shearing Shed
10.25	**Visual traits and reproduction:** What are we learning from MLP about these critical selection elements?	**Jarryd Krog** is a Murdoch honours student and he provides a snapshot of his project that sits within the MLP work.	Averys Shearing Shed
10.30	**Are big ewes more profitable than small ones?** WALRC is keen to have this question answered and part of the answer may come from the GEPEP project which is using new technology including sensors and microwave technology to predict feed intake and estimate whole body energy.	**Andrew Thompson,** Murdoch	Averys Shearing Shed
10.45	**Sensors for measurement of animal behaviours** The possibilities for where sensors take sheep management are endless. It is possible to accurately predict time of lambing from ewe-ram associations during mating, as well as predicting feed intake and methane emissions among other things. Let's hear how far this work has taken us and discuss what's next.	**Beth Paganoni, DPIRD** with new DPIRD recruit, **Kirsty Cunningham** who is about to publish her paper on her sensor project	Averys Shearing Shed
11.00	**Progressing the Melatonin story to drive production:** Treating twin-bearing ewes with melatonin during gestation is able to improve twin lamb production and welfare. But, to further investigate how in-utero/early life events are able to drive production outcomes, UWA in collaboration with Murdoch are developing a novel method to measure ovine foetal physiology in commercial production systems.	**Kelsey Pool**, UWA	Averys Shearing Shed
11.15	**Sheeplinks - FutureSheep:** This is an exciting new DPIRD-MLA funded project that investigates how sheep farmers in the medium to low rainfall zones can adapt to impact of climate in 2030 and 2050. The first tranche of work has been a climate study predicting what the wheatbelt will look like for sheep farmers in the next 20 years	**Meredith Guthrie** with **Kevin Foster,** DPIRD	Averys Shearing Shed Back in Averys shearing Shed

11.30	**Walk to methane chamber**		
11.40	**Measurement of methane emissions and differences between MLP sire groups**: We hear about the scope of this important piece of work.	**Tom La,** Murdoch	Methane chamber set up in the yards
11.50	**The Impact of Crop Height on Survival of Twin-Born Lambs:** This forms a part of a major MLA investment project, "Design, establishment and benefits of edible shelter to improve lamb survival and whole-farm profitability", led by Murdoch University	**Serina Hancock,** Murdoch	Serina stands on a mound by the silos, overlooking her crops
12.05	**Heat stress during joining:** This is a major MLA Donor Company investment project, led by UWA. In its early stages and a great opportunity to understand how its outcomes can impact farm decisions.	**Shane Maloney,** UWA	Move to the closest paddock with the crop height trials - as a back-drop for Shane's discussion
12.20	**Walk back to the shed**		
12.30	**Grab and Go Lunch**		
12.45	**Farm Tour led by Tim Watts:** *Presentations from here on will be delivered either on the bus or outside in the paddock. Timing between them allows for travel and discussion. All presenters listed must still plan for 7 mins presentation, 7 mins discussion*		
1.15	**You're in clover here:** The Annual Legume Breeding Australia (ALBA) Joint Venture with DLF Seeds is delivering some exciting opportunities under the guidance of Phil Nichols. There will be only 3.5 weeks growth on his trial of some new subterranean clover breeding lines for low-medium rainfall areas, but well worth the chance to look at establishment and talk about the Joint Venture hopes to learn from the process.	**Phil Nichols, UWA**	On-site – with entry via misery Hill
2.00	**Shrub design to improve reproductive performance of sheep:** This forms a part of a major MLA investment project, "Design, establishment and benefits of edible shelter to improve lamb survival and whole-farm profitability". CSIRO are leading the space in design and management of shrubs	**Hayley Norman,** CSIRO	**South Averys**

2.30	**Lambing Density:** The lambing density projects have started to transform ewe management nationally. Serina will remind us that there are no simple rules of thumb relating to optimum mob size to improve lamb survival. The next opportunity is a mob-size decision support tool – intended so it's even easier for farmers to make decisions about paddock subdivision for lambing.	While this discussion kicks off with **Serina**, there's other material to talk about at this paddock too, including the impact of confinement feeding on whitegums.	Bus pulls up at **Lambing Observation** tower lambing observation tower
2.40	We stop by the remnant shrubs from Phil Vercoe's completed work.	**General discussion here**	Top Cow Dam
2.50	**Pasture renovation studies: identifying and using new Ute Guide - and renovating oestrogenic sub-clover pastures.** The new oestrogenic clover ute-guide is out and this a great chance to discuss with the researcher who led the process.	**Kevin Foster**, DPIRD with **Megan Ryan, UWA.**	The top pen of Bottom Cow Dam
3.15	**Managing Merino weaners to survive and thrive:** This is an MLA project funded directly from WALRC priorities.	**Caroline Jacobson**, Murdoch	At paddock RF4
3.45	**Meet two of our three WALRC scholarship students**: Georgia Welsh and Eloise Boland both have projects that support the Heat Stress work. This is a mini-insight into their studies that supports the project outcomes.	**Eloise Boland and Georgia Welsh**, UWA Our last stop is a classic example of variations of paddock shelter – which ties in nicely to the heat stress work you heard about earlier.	At Roo Creek
4.00	**Return to Averys**		
4.20	**Back to the shed for the collaborative R&D opportunity discussion where topics include:** • Why Bluesky research is important: Dominique Blache introduces **Luoyang Ding** from UWA to tell us about Gut-Brain-Gene Behaviour – and what those discoveries might bring. • General discussion topics about R&D opportunities including supplementation, lick feeders and technology.		
5.00	**Finish and drive to York Settlers Hotel (*approx. 1hr 10 mins)**		


15 - 21 Jun 2022
PGR
FOO
PGR (kg DM/ha/day)
0 to 9
10 to 19
20 to 29
30 to 39
40 to 49
50 to 59
60 to 69
70 to 84
85 to 99
100 to 119
> 120
1 : 28,783
500 m
1000 m
UTM: N: 6,404,778 E: 487,454 Zone: 50)
OpenStreetMap | Landgate | DPIRD


PGR (kg DM/ha/day)
120
100
80
60
40
20
0
PGR 26.59 kg DM/ha/day
Week 15 (90% Percentile)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Time

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ANOTHER IMPORTANT DATE FOR YOUR DIARY

Monday, August 22nd, 2022

Livestock Matters

Esplanade Hotel, Fremantle

9am to 5pm

A joint initiative of WALRC, AAAS (WA) and MLA

- **All WALRC Tier 1 members are being asked to nominate students to present in session two of the morning.**
  We are looking for 8 outstanding emerging scientists to showcase their projects to a farmer x researcher audience

- **We will launch the Farm a Friend initiative to pair students with farmers for a 12-month period**

- **Plus, great keynote presentations and discussion sessions designed to challenge thinking and progress research and adoption in the WA livestock industry.**

Please bring your people to this important open industry networking day

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Livestock Matters

Where research meets farm in the city

Monday, August 22 at the Esplanade, Fremantle with dinner to follow

mla MEAT & LIVESTOCK AUSTRALIA

AAAS AUSTRALIAN ASSOCIATION OF ANIMAL SCIENCES

And, we want our Tier 1 members to nominate their best students (Honours, Masters and PhD); or, you can nominate an early career researcher - to showcase their work

WALRC is looking for up to 8 emerging researchers to showcase on the stage in front of the research x farm community as a central part of our Livestock Matters forum. They will be asked to present for 7 minutes and expect a further 5 minutes of questions and interaction.

We are expecting an audience of 100-plus – so this is a significant career advancing opportunity.

We are seeking:

- People whose work is part of a larger piece of industry-supported R&D work – so we can explain the value of your work to the industry audience;
- People who are prepared to invest time and thought into preparing a farmer-focused presentation that is easy to recall and understand.

The intention from this segment of the Livestock Matters forum, is that we celebrate the strength of our emerging scientists and connect their work with industry.

Candidates chosen for this presentation opportunity will also be encouraged to participate in the Farm-a-Friend* program that will be a central part of the Livestock Matters day.

The student showcase will take place from morning tea to lunchtime. Students will be encouraged to stay for the entire day and the dinner that follows that evening.

**The Farm- a-Friend program is another new WALRC initiative and information is enclosed in this communique*

PLEASE NOMINATE YOUR STUDENTS FOR THIS PROGRAM BY NO LATER THAN

Friday July 15 to eo@walrc.com.au

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Farm-a-Friend

A linkage program for ag science students, connecting students with farm businesses to bring real life farm challenges to their study program

To be launched in Fremantle at Livestock Matters (the new GLIDO) on August 22, 2022

- **Students interested in being linked to a farm attend the conference and register their name for the Farm a Friend program;**

- **Farmers interested in being linked to a student attend the conference and register their name for the Farm a Friend program.**

Farm commitments:

- Student/s must be welcome to visit the farm at a mutually agreeable date/time on two occasions through the ensuing 12 months;
- Farm must welcome 'inquiring young minds' and be prepared to invest 'ute-time' to get to know the students and their particular area of study;
- Farm must nurture the connection and encourage students to 'ask us anything' with no judgement – to assist in their learning and study journey.

Student commitments:

- To be the 'driver' of the linkage (you must remember the farm-a-friend is possibly busier than you – and will have great intentions but you will be the one ringing to make the arrangements);
- Must equally commit to making two farm visits over 12 months and to make the most of the visits, noting this may help you be better positioned to find future internships;
- Must remember that phone calls to your farm-a-friend will work better than emails!
- Must also remember that it's up to you to make the connection work – and the more you put in the more you get out of it.

Want to know more? See over….

How Farm-a-Friend works

1. Register to attend Livestock Matters at Fremantle on Monday, august 22nd. The day event is free to attend for farmers and students. Program (spear-headed by Victorian producer and Nuffield scholar Michael Craig) and registrations opening very soon;

2. Indicate you'd like to be part of the Farm-a-Friend program;

3. All participating farm businesses will be introduced to the audience at 4pm as part of the conference; and then students will be facilitated through a 'speed dating' style 'meet the farmers' session in the last hour of conference;

4. In anticipation of more students than farm businesses, we may well set up the linkage in pairs – where two students are connected to a single farm business;

5. This is NOT an internship program – simply a 'connection' program – but the connection that the students make may well make it easier for them to successfully arrange an internship.

Rules of Engagement

- WALRC's insurance policy will provide a peace of mind cover for the time spent on farm;

- Students and participating farmers will be asked to go through an induction meeting upon signing up for the program and before the first student first. This will involve an hour on Zoom to be sure everyone understand the program's expectations, the expected code of conduct for both student and farmer along with all relevant OH&S matters.

- Both student and participating farmer will be asked to sign a simple MOU that sets out the obligations (which are few – the whole intent is to make this casual, easy and simply to create a linkage between a practical farmer who loves research and a young, inquiring mind - and an agricultural science student who wants to understand production systems better).

More information or to tender your initial interest ahead of registrations opening, please contact Esther Price at WALRC on 0418 931 938 or eo@walrc.com.au

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The balance of the booklet offers one-page summaries on all the projects you will hear about today. They appear in the order in which they have been presented to you.

WALRC comes to Ridgefield Study Tour	
Project Title:	**Merino Lifetime Productivity (MLP) Project**
Funded by:	Australian Wool Innovation, AMSEA, UWA, MU, FPSB (WA), WA Stud Merino Breeders, Entrants
Key Contacts & Organisation/s involved:	Bronwyn Clarke (Site Manager - Murdoch University) Brett Jones (Site Committee Chair) Tim Watts (Host Farm Manager - UWA)
Project Objectives: The MLP Project is designed to capture lifetime ewe data across diverse environments and Merino types to help better understand and deliver Merino ewe lifetime performance outcomes for the Australian Merino industry.	
Project Summary: The MLP Project is one of five sites across Australia evaluating the lifetime productivity of ewe progeny from 134 Merino rams. The Pingelly MLP is evaluating ewe progeny from 29 different Merino rams born in 2016 and 2017. The ewes are naturally mated to a team of rams each year and reproductive performance recorded (including number of lambs marked and weaned, kg of lamb weaned). Annually the ewes are visually classed for functional, structural, and wool quality traits and they are visually graded into "tops", "flocks" and "cull" categories as well as an additional 5-point grade. Fleece weights are recorded at shearing and wool quality traits are assessed through a mid-side sample taken prior to shearing. Growth and carcase traits are recorded annually though weights, condition score (at least 4 time per year) and fat and eye muscle depth measurements. No ewe is removed from the trial except for welfare reasons. The data collection phase of the Pingelly site will be complete at the end of 2022. Data will be combined with the other 4 sites nationally when they are complete in 2025 for across site analysis.	
Biggest Challenge so far: Managing the sheep "commercially" with set Life Time Ewe Management condition score targets to suit all stakeholders.	
Biggest Achievement so far: Five successful MLP field days at Ridgefield with great industry support and ongoing interest and involvement in the questions that the MLP Project is answering	
Contact details for further information:	Bronwyn Clarke Bronwyn.clarke@murdoch.edu.au 0418 957 293

WALRC comes to Ridgefield Study Tour	
Project Title:	**Visual traits and reproduction in Merino ewes over their lifetime**
Funded by:	The Merino Lifetime Productivity (MLP) Project is funded by Australian Wool Innovation
Key Contacts & Organisation/s involved:	Jarryd Krog, Andrew Thompson and Bronwyn Clarke (Murdoch Uni)
Project Objectives: To investigate the effects of visual and functional classing traits on reproduction in Merino ewes at different stages of lifetime productivity. (such as teats and teeth scores)	
Project Summary: The Merino Lifetime Productivity (MLP) Project at Pingelly involves examining reproduction and wool production of Merino ewes born in 2016 and 2017 for their lifetime. These ewes, from 29 different industry sires, have been naturally mated each year and had reproductive performance recorded in the form of number and kilograms of lambs weaned annually. In addition to common visual classing traits (ie wrinkle, wool quality, classing grade), functional classing traits have been recorded on each ewe at weaning. These traits include teat number and shape and teeth number, alignment and length. This honours project will investigate whether visual or functional classing traits have any impact on reproduction (number of lambs weaned) and if they become more important as the ewes age.	
Biggest Challenge so far: This project is only just starting so no challenges so far. Data is already collected.	
Biggest Achievement so far:	
Contact details for further information:	Jarryd Krog (Jarryd.Krog@murdoch.edu.au)

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Project Title:	**Genetic Evaluation: productivity, Efficiency and Profitability (GEPEP)**
Funded by:	Australian Wool Innovation
Key Contacts & Organisation/s involved:	Andrew Thompson (Murdoch Uni), John Young (Farming Systems Analysis Service), Mark Ferguson (neXtgen Agri), Katanning Research Facility (DPRID) and Ridgefield Future Farm (UWA)

Project Objectives:

To quantify the variability in feed intake, energy reserves and energy partitioning between Merino sire groups within the MLP Project and develop relative economic values and indices that will enable ram breeders to select sheep to improve stocking rate and profit per hectare.

Project Summary:

Current systems for genetic evaluation focus on production per head. Where attempts have been made to predict the profit per hectare of different genotypes, whether at wether trials, progeny tests or on-farm comparisons, we have always assumed that the feed intake of animals will be directly linked to how much they weigh. That is, we assume that the heavier genotypes eat more and therefore must be run at lower stocking rates and their estimated profitability per hectare is adjusted downwards. Unfortunately, this method has some significant flaws because it assumes there are no physiological differences between genotypes that are independent of liveweight. From work in other species and our earlier work in sheep we predicted that there will be differences between genotypes in feed intake capacity, the energy required for maintenance and the partitioning of energy into protein or fat, and variation in these traits will affect potential stocking rate.

Work completed to date at the Katanning Research Facility measured feed intake and energy reserves on 640 MLP wethers from 29 sire groups. It demonstrated a 20-50% range in feed intake (16 vs 21 MJ/day), maintenance energy requirements (7.7 vs 9.5 MJ/day) and whole body fat (16 vs 24%) between extreme sire groups at the same liveweight. The estimated profit per hectare of sire groups predicted using metabolic liveweight versus 'profit per hectare traits' is poor indicating significant re-ranking of sire groups. There also appears to be little if any correlation between estimated mature size and profit per hectare. Current work at Ridgefield is measuring feed intake and whole-body fat on MLP ewes using a range of proxies to establish the heritability of 'profit per hectare' traits and their genetic correlations with other traits.

Biggest Challenge so far:

Scale of work involved including 640 wethers in individual pens for 3 months and 2000 DXA scans!

Biggest Achievement so far:

Clear demonstration that scope to improve genetic evaluation and that intake and whole body fat are likely to make an important contribution to a balanced index to maximise genetic gain in profit per ha.

Contact details for further information:	Andrew Thompson Andrew.Thompson@murdoch.edu.au or 0437 316 117

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WALRC comes to Ridgefield Study Tour	
Project Title:	**Predicting lambing dates accurately through ewe-ram interactions during mating**
Funded by:	DPIRD
Key Contacts & Organisation/s involved:	Kirsty Cunningham (DPIRD), Claire Macleay (DPIRD), Beth Paganoni (DPIRD) Andrew Thompson (MU), Carolina Diaz (AWI)

Project Objectives:
This study aimed to predict lambing dates using proximity sensors for larger numbers of ewes joined with multiple rams on a large paddock typical of commercial production conditions. We reasoned that by measuring the interactions between ewes and rams during mating, as an indicator of time of oestrus, we could accurately predict the lambing dates of ewes under commercial production conditions.

Project Summary:
Ewes often lamb over extended periods so the level of nutrition during pregnancy and lambing maybe sub-optimal for ewes that conceived on their second or third oestrus cycle. Predicting lambing dates would allow cohorts of ewes with similar gestational ages to be managed more precisely to achieve targets for ewe nutrition, feed on offer, mob sizes and access to shelter to improve lamb survival. The interactions between ewes and rams during mating has been used to predict the time of oestrus and lambing dates successfully but this has not been tested at a commercial scale. In this study, proximity sensors were used to measure interactions between inexperienced Merino ewes (n = 317) and experienced rams (n = 9) during a 27-day mating period under commercial production conditions. When the gestation length was assumed to be 150 days, 91% of lambing dates were predicted within ±6 days of the actual birth date of lambs and 84% of lambing dates were predicted within ±3 days. The use of proximity sensors during mating was an effective means of predicting lambing dates, and there was no significant difference in accuracy for single bearing verses multiple bearing ewes. However, DNA parentage data showed the ram corresponding with the maximum daily interaction ratio was the sire for only 16% of all progeny, suggesting they could not be used to indicate the sire of the progeny.

Biggest Challenge so far:
More efficient power sources for proximity sensors are worth developing to make these measures more practical – our rams had to wear three sensors to capture the mating period without mustering.

Biggest Achievement so far:
Estimating an accurate birth date for 91% of lambs from our most difficult co-hort of ewes (maidens) was beyond our expectations of this technology.

Contact details for further information:
Kirsty.Cunningham@dpird.wa.gov.au
Beth Paganoni@dpird.wa.gov.au, 9780 6282, 0448 241 320

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Project Title:	**Treating twin-bearing ewes with melatonin improves lamb production and welfare: investigating how early life events drive production outcomes**
Funded by:	Meat and Livestock Australia, UWA, MU, The Lefroy Bequest, Ceva Animal Health Australia (product).
Key Contacts & Organisation/s involved:	Kelsey Pool (UWA), Dominique Blache (UWA), Shane Maloney (UWA), Serina Hancock (MU), Tim Watts (Host Farm Manager - UWA)

Project Objectives:

Two separate projects are currently progressing under this research theme.

1) Project 1 aimed to determine if treating twin-bearing ewes with slow-release melatonin implants improves lamb production and welfare.
2) As Project 1 demonstrated that in-utero/early life interventions alter lamb production outcomes, a novel method of measuring ovine fetal physiology is under development. The intent of this is to capture physiological data throughout gestation, birth and into early life, within commercial systems.

Project Summary:

In 2021 the effect of melatonin on twin lamb production outcomes was investigated, via treatment of twin-bearing ewes with slow-release melatonin implants at different stages of gestation. This study, replicated across two commercial sites, found that melatonin subtly improved twin-lamb marking and weaning %, as well as increasing lamb weight during these periods.

To further investigate how events during gestation, birth and early life can drive offspring production outcomes, an objective, remote method of measuring fetal physiology is required. This is currently being addressed through optimisation of a novel, minimally invasive laparoscopic procedure to insert micro-biosensors in the ovine fetus. This procedure has been developed and is being adapted for on-farm use by a diverse team of reproductive biologists, veterinarians, animal scientists and neonatologists.

When fully optimised for the field, this methodology will allow us to answer questions around how handling of pregnant ewes, difficult births, climatic events and other environmental factors impact lamb production potential.

Biggest Challenge so far:

Optimising a laparoscopic procedure to be performed rapidly and safely in an on-farm environment.

Biggest Achievement so far:

Demonstration of the impacts of melatonin treatment on lamb production outcomes across two commercial sites.

Contact details for further information:	Kelsey Pool kelsey.pool@uwa.edu.au 0434 148 017

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Project Title:	**SheepLinks - FutureSheep**
Funded by:	Meat & Livestock Australia (MLA) and Department of Primary Industries and Regional Development (DPIRD).
Key Contacts & Organisation/s involved:	DPIRD: Janet Conte, Dr Imma Farre, Dr Kevin Foster, Dr Meredith Guthrie, Sud Kharel, Dr Clinton Revell, Paul Sanford. DPIRD, MLA and Grower Group Alliance. This project has been designed to complement the NEXUS program, a joint research program between the Universities of Melbourne, Tasmania and CSIRO.

Project Objectives:

- Model representative farms in the key sheep producing regions of WA (Western Australia), Bruce Rock, Kojonup and Wagin using the projected climate scenarios for 2030 and 2050.
- Work with producers to identify adaptations to climate change that are profitable, environmentally sustainable and targeted towards future market opportunities.
- Develop a Reference Group for the project including producers, scientists, and consultants.
- "Partner up" farms with others that are already facing their projected future climate.
- Conduct adoption activities including producer workshops and industry forms.

Project Summary:

The specific technologies and practices to be modelled include:

- Altered pasture growth across the growing season (a function of future climate scenarios).
- Their impact on flock structure and enterprise mix (wool vs meat).
- New feed options or systems that can respond to out of season rainfall (tactical) and are adapted to hotter/drier conditions.
- Risk management through business diversification across regions.

Adaptation options

The project will investigate adaptation options which aim to maintain or improve profitability and business resilience in the future. There are three themes for adaptations which may differ based on location.

1. Feedbase - Pasture and shrub species that are better adapted to hotter and drier conditions and able to fill feed gaps. A number of these are currently being field tested by the SheepLinks Feed365 project.
2. Animal management and genetics – Altered management calendars such as joining date, improved reproduction or feed conversion and heat tolerance.
3. Business models – Enterprise balance including crop alternatives and conservation grazing models, alternative markets, for example carbon or sustainable farming, risk management and business diversification.
4. Evaluate methods to reach whole farm carbon neutrality.

Biggest Challenge so far: Establishing a reference group with producers and consultants who are busy already.

Biggest Achievement so far: Future climate projections for the woolbelt in 2030 and 2050.

Contact details for further information:	Dr Kevin Foster: Kevin.Foster@dpird.wa.gov.au (08) 9368 3795

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Project Title:	**Measurement of methane emissions and differences between MLP sire groups**
Funded by:	Australian Wool Innovation
Key Contacts & Organisation/s involved:	Tom La and Andrew Thompson (Murdoch University), John Young (Farming Systems Analysis Service) and Ridgefield Future Farm (UWA)

Project Objectives:

Methane emissions are being measured as part of the *Genetic Evaluation: Production, Efficiency and Profitability* (GEPEP) project. The specific purpose of the methane measurements is to:

1. predict feed intake under grazing conditions,
2. compare different methods of predicting feed intake, and
3. quantify the differences in methane production between sire groups within the MLP project

Project Summary:

The AWI funded add-on project to MLP Pingelly *Genetic Evaluation: Production, Efficiency and Profitability* (GEPEP) has demonstrated a 30% range in potential feed intake between adult wethers from different MLP sires at the same liveweight. Together with similar differences in fat reserves at the same liveweight, these traits are likely influence stocking rate and supplementary feeding requirements and recent economic modelling has demonstrated reranking of sires when these novel traits are accounted for. This component of the GEPEP project utilises the 2016 and 2017 born ewes in the Pingelly MLP project to collect data using the 'best-bet' proxy's for feed intake (and whole body energy) under grazing conditions. Methane emissions and carbon dioxide are being measured using portable accumulation chambers (24 chambers) set up in the shed near the yards. Each animal is measured once in the PACS for 45 minutes in autumn and once in spring. This is being conducted over 2 days for cohort #1 (2016 drop) and over 3 days for cohort #2 (2017 drop ewes) in each season (and requires a small army given other measurements completed at the same time!).

Data collected so far (raw means) indicate a 25% range in methane production between sire groups when measured in spring and a 41% range when measured in autumn. The ranges are still 21% and 33% after correction for metabolic liveweight. Data relating to prediction of intake from methane and carbon dioxide or sensors are still being analysed but show some promise.

Biggest Challenge so far:

- Completing all the measurements whilst ensuring the core MLP project is not compromised in any way.

Biggest Achievement so far:

- Demonstrating the range in methane production between sire groups and scope to predict methane production from grazing behaviours quantifies using wearable sensors

Contact details for further information:
Tom La T.La@murdoch.edu.au
Andrew Thompson Andrew.Thompson@murdoch.edu.au

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Project Title:	**The impact of crop height on survival of twin born lambs**
Funded by:	Meat and Livestock Australia Limited
Key Contacts & Organisation/s involved:	Serina Hancock and Amy Lockwood (Murdoch Uni) Gordon Refshauge (NSWDPI) In collaboration with the wider 'shade and shelter' teams from UWA and CSIRO

Project Objectives:
The project aims to assess the impacts of crop height on lamb survival, including ewe behaviour and utilisation of the crop. The outcomes of this project will include an improved understanding of the advantages and risks associated with the utilisation of crops for shelter during lambing. This experiment contributes to a larger project which will develop producer guidelines for the establishment, management and use of edible shelter for lamb survival, animal welfare, management of the feed-base and ecosystem health

Project Summary:
We know that cereal crops have a high nutritive value and ewes grazing cereal crops can gain condition score in late pregnancy even when FOO is as low as 200kg DM/ha. Cereals crops also have a complex mineral composition that can increase the risk of metabolic disease, but supplementation with causmag, lime and salt can improve the calcium status of pregnant ewes.

Less is known about the impact of grazing cereal crops during lambing on ewe and lamb survival. We also don't know if changes in crop height will impact lamb survival. Anecdotal evidence suggests that if the average height of the crop is too high then ewes may lamb where the crop is shorter and hence not utilise the potential shelter, whereas if the average height of the crop is too low then there are no shelter benefits. It has also been suggested that if the crop is too high the ewe loses the lamb and hence lamb survival decreases.

Using GPS and activity loggers we will assess ewe behaviour and utilisation of the crops of varying height. Temperature, wind speed and direction of rainfall, and the height, density and configuration of crop will be measured by using remote sensor technology.

Biggest Challenge so far:
Getting the crop to the treatment heights

Biggest Achievement so far:
Getting four sites with three replicates of each treatment and getting the technology to measure ewe behaviour and utilisation

Contact details for further information:	Serina Hancock (S.Hancock@murdoch.edu.au)

WALRC comes to Ridgefield Study Tour	
Project Title:	**Investigating heat stress in ewes – reproductive performance**
Funded by:	Meat and Livestock Australia Limited
Key Contacts & Organisation/s involved:	Dominique Blache (CI – UWA) Shane Maloney (CI – UWA) Serina Hancock (CI – Murdoch) Hayley Norman (CI – CSIRO)
Project Objectives: The project aims to quantify the effects of heat events on sheep reproduction, thermoregulatory capacity, behaviour, and wellbeing through long-term data collection during a range of climatic conditions in diverse production settings. The outcomes of this project will inform mitigation strategies to reduce reproductive losses that are related to heat-stress and allow for further avenues for investigation into management options.	
Project Summary: The project commenced this January and is intended to run for three joining periods. Three sites were established for the duration of joining (n = 5 - 6 weeks) from January to March 2022. Two commercial sites, one in the eastern wheatbelt (Kellerberrin) and one was in the northern wheatbelt (Moora) consisted of one paddock each. An intensive site at UWA Ridgefield farm (Pingelly) consisted of three paddocks with no shade, medium shade, or high shade. At the commercial sites, 50 ewes on each farm, and at Ridgefield, the 250 ewes and six rams in each paddock, were fitted with rumen capsules that contain a logger that records temperature every five minutes, and a collar containing a GPS unit (fix each 5-minutes), proximity between ram and ewe, and 3-axis accelerometer that records movement at 25 Hz. Several weather stations recording standard meteorological variables are placed in each paddock. From the data we will assess the intensity of mating (and general) activity versus ambient conditions and body temperature to assess the importance of heat stress on reproductive capacity.	
Biggest Challenge so far: Getting all of the technology working and ready, and making it fit with the logistics of joining	
Biggest Achievement so far: Good data from 550 of the 770 collars. Data from a subset of temperature loggers will be available in October.	
Contact details for further information:	Dominique Blache (dominique.blache@uwa.edu.au)

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WALRC comes to Ridgefield Study Tour	
Project Title:	**Annual Legume Breeding Australia (ALBA)**
Funded by:	A Joint Venture between UWA and DLF Seeds
Key Contacts & Organisation/s involved:	Phil Nichols (Plant breeder – UWA) Brad Wintle (Senior Research Officer – UWA) Prof Megan Ryan (UWA) Prof Willie Erskine (UWA)

Project Objectives:
To breed more productive and persistent annual pasture legumes for the farming systems of southern Australia.

Project Summary:
Annual Legume Breeding Australia is a Joint Venture, launched in 2019, between the University of Western Australia and DLF Seeds (formerly known in Australia as PGG Wrightson Seeds). It aims to breed more productive, persistent and innovative annual grazing and fodder legumes to benefit the livestock and grains industries of southern Australia. Key species currently undergoing breeding and selection include subterranean clover, balansa clover, Persian clover, arrowleaf clover, crimson clover and purple clover, while other species will be considered for future work.

The subterranean clover variety trial at Ridgefield is aimed at selecting new varieties for low-medium (300-500 mm) rainfall areas. The trial (sown on June 1, 2022) contains 29 early flowering breeding lines and seven cultivars. The breeding lines are selected survivors from long-term trials originally sown to highly diverse germplasm at Wongan Hills, Wundowie, Esperance in WA and Wagga Wagga (NSW). Screening has been conducted for early flowering, low formononetin content, hardseededness and high winter and spring vigour. The trial will run for three years and be subjected to regular grazing and typical farm management. Sister trials are located at Katanning (WA), Forbes (NSW) and Maryborough (Victoria). Measurements will comprise winter and spring biomass over 3 years, seedling regeneration density, seed production and reaction to pests and diseases.

Biggest Challenge so far:
Overcoming weather, weeds, pests, machine breakdowns and all the other vagaries of farming.

Biggest Achievement so far:
Selection of three new subterranean clover cultivars for high rainfall areas, which are currently undergoing seed increase.

Contact details for further information:	Phil Nichols phillip.nichols@uwa.edu.au 0418 955 943

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WALRC comes to Ridgefield Study Tour	
Project Title:	**Design and management of edible shelter**
Funded by:	Meat and Livestock Australia Limited
Key Contacts & Organisation/s involved:	Hayley Norman, Matt Wilmot & Dean Thomas (CSIRO) in collaboration with the wider 'shade and shelter' teams from UWA, Murdoch and NSWDPI.

Project Objectives:

In the shrub component of 'shade and shelter' we will investigate the structure and design of edible shrub shelter belts. There are two components, (1) utilise existing commercial shrub stands to enable data collection from lambing ewes, and (2) establish new shrub sites to evaluate the impact of different configurations and densities of shrubs on microclimate. There are currently no recommendations for producers regarding shrub species selection, density and planting configuration to optimise shelter and feeding value. It is also unclear if relatively unpalatable shrubs should be incorporated to improve the shelter value of stands or if relatively palatable shrubs attract ewes and keep them in a location. Four shrub design and management research sites will be established on farms in July 2021 and 2022. Sites will be characterised and monitored with a range of tools to investigate the impact of the shrubs on microclimate at a spatial scale. The effect of shrub design (configuration and density) on lamb survival or ewe and lamb well-being will be measured. The utilisation of shrubs will be monitored over 2 years with grazing by twin-bearing ewes at lambing and during the summer. Data from these experiments and from the shrub paddocks used in the 'Shelter and lamb survival' research sites will inform systems modelling to determine benefits and risks associated with implementing shrubs into a farming system. Six treatments for subplots include;

1. Anameka™ saltbush (palatable) planted at commercial densities **perpendicular** to the 'killing' wind
2. Anameka™ saltbush in dense double hedgerows, planted **perpendicular** to the 'killing' wind
3. Rhagodia preissii shrubs (similar size to Anameka but relatively unpalatable) planted as above
4. Adjacent rows of Anameka™ and Rhagodia planted as above
5. Adjacent rows of Anameka™ and Rhagodia planted in dense hedgerows **parallel** to the 'killing' wind direction.
6. A 'control' area of volunteer pasture.

Project Summary:

In Australia, 30% of lambs born die before marking at a cost of over $1B per year. Most lamb deaths occur within three days of birth and 30-50% of these deaths are from the starvation-mismothering-exposure complex. Hypothermia plays a major role in these deaths and effective shelter can significantly improve survival. Integration of shrubs for shelter could also provide additional benefits as a feedbase, and for land management and sustainability. This research project will investigate the impacts of different types and designs of edible shelter on the physiology, behaviour, welfare and survival of sheep along with the nutritional benefits of the feedbase in mixed farming enterprises.

Biggest Challenge so far:

Cloning 20, 000 rhagodia shrubs and discovering their sensitivity to acidic soils by accident.

Biggest Achievement so far:

Hand-planting 20, 000 shrubs with 5cm accuracy.

Contact details for further information:	Matt Wilmot (Matt.Wilmot@csiro.au)

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WALRC comes to Ridgefield Study Tour

Project Title: Lambing density

Funded by:	Australian Wool Innovation, Meat & Livestock Australia, Meat & Livestock Australia postgraduate scholarship and Australian Postgraduate Award
Key Contacts & Organisation/s involved:	Amy Lockwood (PhD project) & Serina Hancock, Murdoch University

Project Objectives:

The lambing density work aimed to quantify the impacts of the mob size and stocking rate (SR) of ewes at lambing on ewe-lamb behaviour and lamb survival.

Project Summary:

Data collected from producers and at the 85-on farm research sites across Australia showed that, on average, reducing mob size at lambing by 100 ewes increased the survival of single-born lambs by 0.8% and twin-born lambs by 2.2%, regardless of breed and SR. Economic modelling showed that optimum mob size is most sensitive to ewe pregnancy status, the cost of paddock subdivision, whether the benefits of improved pasture utilisation are capitalised in permanently fenced paddocks and the target return on investment. Optimum mob sizes are;

- ≈55-62% smaller for twins than singles, at the same SR
- ≈35% smaller when using temporary vs permanent fencing. This is reduced by a further 45-55% if a water supply is not required.
- ≈60% smaller if the impacts of pasture utilisation are included. This effect is greater at lower SRs.
- Greater when the target return on investment is higher

Optimum mob size was less sensitive to SR, breed, scanning percentage and lamb price. The factors influencing optimum mob size vary between enterprises and therefore no generic recommendations can be made. Paddock subdivision to reduce mob size at lambing was profitable for most scenarios. Producers should prioritise smaller mobs and paddocks for twin-bearing ewes and split up big mobs first. Permanent subdivision generates the greatest economic returns over the long-term because of the opportunity to increase stocking through improved pasture utilisation. However, temporary fencing is cost-effective and provides flexibility for paddock use.

Mob size (50 vs 130) had no effect on the survival of single- or twin-born lambs at Ridgefield in 2016 when feed-on-offer (FOO) was >2700 kg DM/ha. However, the survival of twin-born lambs was 6.2% greater when ewes lambed in mobs of 55 vs 210 ewes at Ridgefield in 2017, when FOO was <400 kg DM/ha and ewes were trail fed during lambing. These findings suggest that the benefits of lambing ewes in smaller mobs may be greater when feed-on-offer is limited at lambing and ewes are supplementary fed. No significant impacts of mob size on ewe-lamb behaviour were observed.

Biggest Challenge so far:

Decisions regarding selection of lambing paddocks and subdivision to reduce mob size can be quite complex as factors including FOO and shelter availability need to be considered. Development of a decision support tool would assist producers to adopt smaller mob sizes at lambing.

Biggest Achievement so far:

Some producers have adopted paddock subdivision and reduced mob sizes at lambing and have achieved higher marking rates. It is great to see that our work is contributing to improving the reproductive performance of the national flock.

Contact details for further information:	Amy Lockwood: a.lockwood@murdoch.edu.au Serina Hancock: s.hancock@murdoch.edu.au

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WALRC comes to Ridgefield Study Tour

Project Title:	**Managing Merino weaners to survive & thrive**
Funded by:	Meat and Livestock Australia Murdoch University
Key Contacts & Organisation/s involved:	Caroline Jacobson and Bronwyn Clarke (Murdoch University) Katheryn Egerton-Warburton (NSW Department of Primary Industries) John Young (Farming Systems)

Project Objectives:

This project will answer the following research questions

1. What are the impacts of increasing growth between weaning and joining (at 19 months of age) for weaner survival and lifetime reproductive performance?
2. Does the timing of feeding for 'extra' growth impact outcome?
3. Do genetic selection strategies offer opportunity to improve Merino survival weaning to 12 months across different production environments?
4. How can we use post-weaning nutrition and management strategies to improve farm profitability and sheep welfare for a range of Merino genotypes on mixed farms across Australia?

Project Summary:

Merino weaner survival remains an industry-wide issue with previous studies showing 50% of farms reporting Merino weaner mortality above industry targets. Poor maiden reproductive performance in Merinos also remains an issue with 24% lower marking rate in maiden Merino ewes compared to mature ewes. This project will identify strategies for post-weaning nutrition and management to improve weaner survival and lifetime reproductive performance across a range of Merino genotypes.

A series of on-farm study sites is being established that will compare impact of feeding for 'extra' growth early (weaning to 12 months) or late (12 months to joining) in 'commercial' flocks. Ewes included in the study have ASBV and have been selected to represent a range of genotypes, and study farms will represent a range of geographical regions.

Two sites in WA commenced with 2021-drop ewes. There was variation in weaner mortality between the two sites (1% vs 7.8%) in year 1, but no difference between 'high' and 'normal' feeding groups.

Biggest Challenge so far:

- Maintaining weight differences between 'high supplementation' and 'normal' weaners in fluctuating summer feed environments

Biggest Achievement so far:

- Experiment underway with 2021-drop ewes at two WA sites and about to commence at two more WA sites with 2022-drop ewes

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WALRC comes to Ridgefield Study Tour	
Project Title:	**Impact of shade availability and heat stress on joining behaviour and success in merino sheep**
Funded by:	Meat and Livestock Donor Company, WALRC
Key Contacts & Organisation/s involved:	Eloise Boland (Master of Ag Sci Student – UWA) Dominique Blanche (Professor – UWA) Shane Maloney (Professor – UWA) Tim Watts (Host Farm Manager - UWA)

Project Objectives:
The aim of this project is to determine if there is a link between heat stress, merino behaviour and merino reproductive success in order to better understand what influences reproductive success.

Project Summary:

The project takes place at the UWA Ridgefield farm in West Pingelly. The project uses 750 merino ewes and 18 merino rams divided over three paddocks with 250 ewes and 6 rams per paddock, each with varying shade, zero, medium and high. Each paddock has weather stations spread throughout in order to capture the individual paddock microclimates. After a 35-day joining period, the rams will be removed from the ewes, and all ewes will be run together, followed by pregnancy scanning seven weeks post ram removal.

Using collars worn by each animal, GPS data along with activity and proximity data will be collected. This data will then be analysed in order to look at location and behaviour. Maps will be created using GPS data to show how the mobs utilized the paddocks. The collar data will also be used to determine distance from water, movement speed, ewe distance from ram, distance travelled, panting score and any sexual activity. The pregnancy scan results will be used to indicate initial joining success, and this will be followed by lamb marking percentage to show final joining success.

Biggest Challenge so far:
Some collars malfunctioned, either breaking or the GPS randomly restarting, which has meant that not all sheep can be used in the final results due to incomplete data sets.

Biggest Achievement so far:
The project being acknowledged by WALRC, in the form of awarding me a scholarship, was encouraging as it showed that the project has potentially significant outcomes.

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WALRC comes to Ridgefield Study Tour	
Project Title:	**Water intake during joining under heat stress**
Funded by:	UWA, MLA, WALRC
Key Contacts & Organisation/s involved:	Georgia Welsh (Master of Ag Sci Student – UWA) Dominique Blache (Professor – UWA) Shane Maloney (Professor – UWA)

Project Objectives:

The aim of this project is to determine whether access to shade changes water consumption and behaviour leading up to drinking and how this may impact reproductive performance in merino ewes. The project will examine the intricate relationship between shade availability, climatic condition and water intake behaviour and how this impacts frequency and volume.

Project Summary:

This project involves three paddocks with differing levels of shade located on the UWA research farm in Pingelly, Western Australia. Throughout joining, each paddock was monitored for weather, dam temperature, and water quality.

There are 250 ewes per paddock (750 in total). During joining, paddock movement was monitored by GPS, proximity and activity sensors, attached to their necks via a collar. Reproductive performance data, BCS and liveweight has also been collected.

50 ewes have been randomly selected in each paddock for ruminal temperature monitoring. Temperature data is collected every five minutes via a ruminal bolus inserted via a drench gun prior to joining. This device will be removed when the ewes are culled at weaning. We will use rumen temperature monitoring to measure deviations caused by water consumption, with a focus on extreme heat events that occur during joining. Water intake temporarily decreases rumen temperature; therefore, we can use this as a proxy to predict both frequency and volume of water consumption.

A laboratory simulation will also be conducted to look at the different factors associated with temperature drop characteristics, including number of drops, mean amplitude of the drop and mean recovery time. This will produce a general-fixed threshold and an animal specific threshold for water consumption.

Biggest Challenge so far:

There have been technical issues with battery life of sensors and corrosion of rumen bolus temperature monitoring devices, meaning that some ewes will have incomplete data.

Biggest Achievement so far:

Receiving the WALRC scholarship for this project has been extremely gratifying and provided me with excellent opportunities for producer networking and advice from industry leaders.

Contact details for further information:	Georgia Welsh 22963181@student.uwa.edu.au 0409 833 036

WALRC comes to Ridgefield Study Tour	
Project Title:	Synergistic effects between microbes and host genetics in the behaviour and health in Merino sheep
Funded by:	State Key Laboratory of Sheep Genetic Improvement and Healthy Production, Xinjiang Academy of Agricultural Reclamation Sciences, Shihezi, China.
Key Contacts & Organisation/s involved:	Luoyang Ding[1]; Dominique Blache[1]; Mengzhi Wang[2] [1]School of Agriculture and Environment, The University of Western Australia, Perth, Australia [2]College of Animal Science and Technology, Yangzhou University, Yangzhou, China
Project Objectives: To understand the potential synergistic effects between the gut microbiota and host genetics, on desired behavioural traits in sheep and the mechanisms that underlie that synergism. We will identify genetic markers for breeding to select sheep with preferred behaviours, and potentially for production traits. We will also develop probiotic products that can be used to improve sheep behaviour.	
Project Summary: Two groups of juvenile ewes (100 sheep in each group) that have extremely different responses to a standard test of behaviour (an isolation box test that measures the response of a sheep to social isolation) will be selected from a pool of 300 ewes. The two groups of sheep will undergo a series of behaviour tests to estimate several behavioural traits including fearfulness, novelty seeking, learning ability, and memory. The body mass and body condition score of the 200 sheep will be measured at the start and the end of the project (that will last for nearly two months). Ruminal contents and faeces from each sheep will be sampled for metagenome shot-gun sequencing to collect data on the microbiome. Blood from each sheep will be used for whole genome sequencing and metabolome profiling, and the measurement of biochemical indices that are related to immune function. We will investigate whether variation in the microbiota, the host genome, and the blood metabolome, is associated with the host's behavioural traits, growth, and immunity.	
Biggest Challenge so far: The extraction of genomic DNA and multiple sequencing is really expensive. That cost increased by more than 30% in 2022, creating limits on the further collection of long-term data on the reproduction, growth, and immune state of the sheep.	
Biggest Achievement so far: The collection of data on the behavioural phenotypes of more than 200 Merino ewes, including their responses to standardised stressors, their learning behaviour, and exploration behaviour. The collection and extraction of genomic DNA from the sheep and the microorganisms in their gut and rumen.	
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WALRC comes to Ridgefield Study Tour

Project Title: Towards 90 (T90)

Funded by: Meat and Livestock Australia

Key Contacts & Organisation/s involved:
Dr Kirsty Kennedy, Dr Andrew Kennedy (Thrive Agri Services)
A/P Andrew Thompson (Murdoch University)
Dr Mark Ferguson (Nextgen Agri)
Tim Leeming (Paradoo Prime)

Project Objectives:

- Develop a framework and operating model for an adoption program that integrates Focus Farms, Exchanges (PDS style group model) and Teams (LTEM model small groups) that are facilitated by industry consultants and advisors throughout southern Australia.
- Develop 10 learning packages based around the sheep reproductive cycle, including online resources, presentations, videos and tools.
- Commission 90 Exchanges and 270 Teams over the duration of the project (3 delivery years).
- Convene annual T90 Field Days at each of the 3 Focus Farms (Located VIC, NSW, WA).

Project Summary:

The Towards 90 or T90 program is all about sheep reproduction best practice. In simple terms, implementing the management to sustainably generate more lambs to sell. The T90 brand reflects the aspirational targets of achieving 90% or greater survival in single and twin-bearing ewes. Why is 90% so critical? If you achieve 90% or greater survival in both single and twin bearing ewes, then you have successfully implemented a series of best-practice management that optimises the reproductive performance of your flock. The T90 program includes:

- **T90 Farms** are leading farm operations that open their doors for participants to see how the T90 best-practices are implemented across the reproductive cycle and at farm scale. The T90 Focus Farms host the T90 Field days and host T90 Exchange and T90 Team participants up to 4-5 points throughout the year.
- **T90 Exchanges** are where a group of 10 or more producers can implement a T90 practice on one of the group members farms with the help of a consultant or service provider. These are a chance to trial and observe the practice in your own neighbourhood!
- **T90 Teams** are where 5 producers come together and with the support from a consultant or service provider implement a T90 practice on your own farm, while observing and learning with your peers.

Biggest Challenge so far:

Developing module content from a range of sources and translating research data sets into learning materials

Biggest Achievement so far:

Implementation of the learning management systems, website and marketing program.

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