Can we find a better way to compare **sheep performance and profitability** on a per hectare basis?

MLP F1 **ewes being assessed for methane and carbon dioxide** as a proxy for feed intake.

The AWI-funded study 'Genetic Evaluation of Productivity, Efficiency and Profitability' (GEPEP) with Murdoch University aims to determine if it is possible to improve current estimates of profitability per hectare, by assessing feed intake and total body energy reserves (proxies for feed efficiency), rather than the current blunt use of metabolic body weight (DSE rating).

The previous project update was provided in the March 2021 edition of *Beyond the Bale*. The MLP F1 wether data from the DPIRD Katanning animal house trials has pointed to considerable individual and sire differences in feed intake, whole-body energy and production. The project has moved to field evaluation of their sisters, the MLP F1 ewes at 'Ridgefield Future Farm' Pingelly WA.

We currently have a world-leading evaluation of the productivity of Merino sheep and their ability to pass those traits on to their progeny through their 'Breeding Value', but it is largely based on a per head basis (MERINOSELECT).

An improvement would be if we could find animals with highly productive breeding values that also eat less while also being in good condition score. If the progeny of these animals could be productive, run at higher stocking rates or in higher condition score to gain additional production, or require less supplementary feeding, then we will be selecting animals that are more profitable on a per hectare basis.

To achieve this, several key questions need to be answered:

- Is feed intake and whole-body energy heritable? And high enough?
- What is the relative economic value of each trait? (So they can be added to an economic index.)
- What are the correlations with other traits? (Can progress occur in all key traits?)
- Can we find low-cost measures of feed intake and whole-body energy? (Ideally, we can use existing measures, but we may need new specific low-cost measures.)
- What is the best age to conduct the feed intake and whole-body energy measures?

The results from animal house trials completed on the wethers were sufficiently encouraging to progress the work to field trials on the MLP F1 ewes at the Pingelly site.

Productivity

The MLP F1 ewes are being measured and classed for a large range of wool, carcass, reproduction, health and welfare traits as part of the MLP trial to 5 and 6 years of age.

Over the next 18 months, the 2016 and 2017 ewe drops will be twice assessed in spring and autumn as 5-year-old ewes for feed intake and whole-body energy reserves.

Feed intake

The GEPEP trial is using two measures of feed intake:

Sarah Blumer, Andrew Thompson and **Jarryd Krog** of Murdoch University, enjoying Pingelly's MLP Field Day, October 2021.

- Use of AWI smart ear tags and halter 'accelerometers' over a five-day period. These devices measure grazing behaviour which is known to be related to feed intake. The spring assessments are conducted on an oat crop and the autumn assessment in confinement feeding.
- Methane and carbon dioxide measures from standing one hour in a Portable Accumulation Chamber (PAC). Other work has shown strong phenotypic and genetic correlations between gas production and feed intake.

The tags will be cheaper but there is also an advantage in the methane assessments for breeders looking to reduce future methane production.

Whole-body energy

The GEPEP trial is assessing a range of options:

- Existing condition score and ultrasound scan.
- Microwave race side scan of fat depth.
- A blood test to measure the concentration of leptin, a hormone produced by fat tissue.
- A blood sample collected six hours after injecting a known amount of deuterium to measure the concentration of deuterium ('heavy' water). The dilution of the deuterium is related to body water content and body fat.

If the current ultrasound scan can be used, this will be the most cost effective, but a race microwave scan is also relatively cheap.

Whole-body energy may be more easily adopted and commercialised and feed intake and/or methane introduced at a later stage.

Where to from here?

The final GEPEP data will be collected in autumn 2023 and will need to be fully analysed.

The GEPEP project team is in constant discussion with AGBU and Sheep Genetics about how and when the information could be utilised by MERINOSELECT Indexes.

More data may be required. MLA has funded a methane project that will assess the Macquarie and New England MLP F1 ewes. This would broaden the measures and Merino types being assessed. Sire Evaluation Sites are another possibility for further data collection.

New Zealand has manufactured trailers with eight PACs each that can be transported between farms.

Improving feed efficiency per unit of production has long been a Merino aspiration. However, the technology has been complex to master as has developing economic field assessments. Technology breakthroughs with DEXA machines, methane and carbon dioxide assessments, and smart tags have assisted with the recent progress with feed efficiency. While recent progress is encouraging, more field trails and analysis are required before the technology can be commercialised. B

More information

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Tribute

Sarah Blumer, the Project Leader in the AWI – Murdoch University GEPEP project, sadly passed away in January. Sarah's industry legacy will long reflect her passion for sheep and sharing research findings with producers. Our best wishes to her family, friends and colleagues.

Virtual fencing pushes boundaries with technology

An AWI-supported project is under way to field test a 'virtual fencing' system that enables sheep, which are fitted with a GPS-enabled device, to be contained on an area of paddock without the need for normal fencing.

Virtual fencing is an animal-friendly fencing system that enables livestock to be contained (or moved) without the need for conventional 'visible fences'.

A virtual fence is an invisible line in the landscape that can be created on a map on a computer/tablet – and moved or erased at the farmer's touch. Animals wearing a GPS-enabled device are warned of the presence of the 'invisible fence' through an audio cue from the device and learn to respond to this. If the beep is ignored, the device delivers a short, mild electric pulse.

There has been significant industry interest in the development of virtual fencing systems due to their potential benefits that include:

- increased productivity and profitability through improved feed utilisation and better matching of animal demands to feed supply and quality
- improved environmental and sustainability outcomes such as reduced overgrazing and better weed control and nutrient management
- improved labour efficiencies and reduced capital investment in real/visible fencing.

CSIRO is carrying out a series of virtual fencing trials for cattle and sheep, with support from AWI and GRDC. The aim of the AWI investment is to be able to apply virtual fencing to sheep using a system similar to the now commercialised eShepherd neckband that has been developed for cattle by CSIRO and Gallagher.

However, it has been identified that a neckband on its own is not a practical option for sheep due to the growth and insulating properties of wool. Therefore, investigations into the practicality of a virtual fencing ear tag are now being conducted by CSIRO.

An initial study found that learning responses to stimulus applied through ear devices were similar to application via a neckband. It was effective at keeping sheep out of a prescribed area in a paddock and sheep return quickly to grazing after experiencing the virtual fence.

Development by CSIRO is now under way to fully automate the process in GPS-enabled devices for sheep, to allow larger scale sheep trials to be carried out on mixed farms with larger sheep numbers and longer trial periods for more intensive grazing pressure.

The challenge will be to develop an ear tag system, incorporating both electrical stimuli and audio cue, that is practical and viable in a commercial environment. B