

Sheep Reproduction Strategic Partnership

Terms of Reference

The preliminary findings from the Sheep Reproduction RD&E Impact Assessment review, conducted by Lee Beattie (Beattie Consulting Services) & Kristy Howard (Inspiring Excellence), have been collated.

Amongst the key findings, there is a perceived lack of economic evaluation and quantification of the value of improvements to reproductive performance at both the farm and enterprise level. Producers need to be able to assess the opportunity cost of not making a change and this is currently not well defined by region, flock type and enterprise structure. As such, there is an urgent need to provide clear messaging, sufficient tools and processes to assess the opportunity and cost of implementing changes for individual businesses based on their circumstances.

Whilst defining the economic value proposition is a crucial component of incentivising and achieving improved reproductive performance, through implementation of best practice, there is also a clear need to evaluate and address human social factors that can also act as barriers to adoption. Non-economic barriers may include a lack of confidence in implementation, competing demands for labour from other enterprises (e.g. cropping) or other personal barriers to change e.g. planned near-term retirement. Extension and adoption activities therefore need to, improve the evaluation of the target audience to ensure initiatives, messages and materials are individually relevant, consider a range of learning styles, and critically evaluate previous performance and predicted adoption rates.

Furthermore, to enable industry investments to be dynamic and responsive to evaluation, there is a need to track and evaluate the drivers of changes to reproductive performance rates. This evaluation process must be able to account for regional specificities, flock types, enterprise structures and seasonal variation and report on scanning, marking, weaning and slaughter rates. Currently no standardised industry approach exists to tracking these trajectories. Three of the most widely used datasets are collated by ABARES, ABS and the MLA/AWI Sheepmeat and Wool Survey. However, each collects and reports data in different ways employing different sampling methodologies. This makes consistent evaluation of investments extremely challenging, particularly at the regional level where localised events may have significant short-term effects on performance.

Each of these three areas, defining the value proposition, understanding the human social factors and tracking reproductive trends are pre-requisite components required to define, enable and track the impact of past and future initiatives.

As such, the following three Terms of Reference (TOR) are put forward against the first three pillars of the Strategic Partnership.

Pillar One – On-Farm Best Practice Management

Examine the economic impact of reproductive performance at the farm level, by region, breed and flock structure.

Applications against this TOR must:

- Measure the relative contribution of **reproductive rates as a driver of profit**, against other opportunities, in the major sheep production systems
- Complete **robust benchmarking** of the impact of changes to reproductive performance on the profitability of sheep systems. This must be applicable across regions and flock types.
- Evaluate the strengths and weaknesses of **current economic evaluation models**
- Facilitate evaluation of the effect of changes in reproductive performance at the **farm business level** (primary focus) and enable an estimate of regional and national impacts to be made.

Pillar Two – Human Social Factors

Examining adoptability. Individual, social, economic and structural factors.

Applications against this TOR should:

- **Be people focused** and consider social and psychological factors
- Focus on how to **better identify target audience** accounting for personal and business drivers.
- **Evaluate engagement strategies** and information pitching based on individual learning styles, profiles **and social drivers**
- Critically evaluate achievable **peak adoption** and establish practical limits to adoption
- Evaluate specific existing or proposed **delivery structures**
- Draw comparisons between **adoption of new practices, technologies or processes** in agriculture and other sectors.

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- Draw comparisons between adoption of new practices, technologies or processes in agriculture and other sectors.

Applicants bringing novel approaches or approaches employed in other sectors are encouraged.

Pillar Three – Enabling Technologies

Develop a nationally applicable process for measuring scanning, lambing and weaning rates, trends and projections.

Applications against this TOR must:

- Review the strengths and weaknesses of existing reproductive data collection and reporting processes
- Put forward a proposed methodology for the development of an improved data insights process. This must account for regional, flock, enterprise structure and seasonal differences
- Complete a comprehensive evaluation of the costs of implementing and managing the proposed process on an ongoing basis.

Pillar Four – Basic Research & Development

To inform the direction of the fourth Strategic Partnership Pillar – Basic R&D – and recognising the need to ensure that there is also a pipeline of research to address some of the sectors longer-term opportunities and challenges, SALRC, WALRC and the Red Meat Panel have previously endorsed the undertaking of specific scoping studies. In FY 19–20 these included:

1. A Review of the Impact of Heat Stress on Reproductive Performance in Sheep
2. A Review of Maternal Dystocia – Nutritional and Non-Nutritional Factors
3. Optimising Ewe Reproductive Performance in Containment Areas

The first two of these studies are now complete and the below TOR are collated against the highest priority recommendation from each of these studies.

Defining fitness to lamb.

It is estimated that upwards of 50% of lamb mortalities are associated with dystocia; including still births and perinatal deaths with evidence of hypoxic injury. Factors that influence the ewe's fitness to give birth and lamb viability include:

- Lamb birthweight
- Ewe maturity
- Ewe liveweight
- Ewe BCS, profile and fatness
- Glycogen in uterine muscle
- Ewe mineral status

Applications against this TOR should:

- a. Investigate and analyse existing datasets where fitness to lamb control points and dystocia have been measured or may be indicated
- b. Collate information on known and potential risk factors
- c. Conduct field studies to test the impact of a range of factors on incidence of dystocia. This may include factors such as age, genotype, seasonal condition, BCS and metabolic state.
- d. Evaluate the physiological mechanisms associated with dystocia with a focus on metabolic state and hormonal influences. Studies should include an evaluation of glycogen in uterine muscle, ewe aerobic fitness, sub-clinical hypocalcaemia, pregnancy toxaemia and oxidative stress.

Steps a) and b) are considered pre-requisites, whereas steps c) and or d) may be re-evaluated or the sequence reversed depending of the outcomes of steps a) and b).

Impact of heat stress on reproduction – animal responses and the micro-climate

Heat stress is thought to significantly affect the reproductive performance of circa 40% of the national flock reducing lambs weaned by an estimated 2.1 million per annum. As such, this priority has two essential components:

1. Observe, monitor and analyse the physiological, homeothermic and behavioural responses of sheep to the climate experienced between spring and early autumn (heat stress risk period) and relate these to responses to sexual behaviour and fertility methods. Data collected must:
 - a. Be relevant to practical containment, paddock and or rangeland situations.
 - b. Be collected sequentially over a minimum of three years to determine if behavioural responses are repeatable and the extent to which responses vary between animals.
2. Quantify and map in paddock microclimates to determine the extent and temporal stability of microclimates, investigate how these are utilised by sheep. Then, by monitoring the physical microclimate and sheep behaviour identify the direct effects of these microclimates on core body temperature and homeothermy.