Producer identified RD&A priorities

Council: **WALRC**

Program area	Priority rank	Committee origin	New or ongoing priority?	Outcome sought	To adequately achieve the outcome, identify R&D and/or adoption gaps or strategies? • ***For R&D, clearly identify the research gap.*** • ***For adoption, detail a possible strategy that producers would engage with to achieve the intended outcome.***
Sustainable Feedbase Resources	*Feedbase Rank = 1*	WALRC	New	**A diverse feedbase system that increases red meat production, boosts whole-farm profitability and reduces risk in the Mediterranean zone** The Mediterranean climate zone of southwestern Australia is characterised by highly seasonal variation in feed quantity and quality. For the rangelands and agricultural zones, climate change will increase variability in the feeding value of the feedbase and therefore farming risk. Many producers in the agricultural zones run mixed farming systems, so the feedbase interacts with a cropping system. This priority seeks to identify, develop and quantify the benefit of a range of interventions to improve the quality and quantity of feed, reduce within and between-season variability in nutrient supply and understand the potential impact of feedbase changes over the whole farming system. Partnerships between research agencies, producers and consultants are critical in delivering impact.	***R&D Gap:*** 1. **A systems-based approach** to understanding the productivity of the existing feedbase and identify opportunities for intervention in the context of future climates and production systems. We need to move from a paddock gross margin approach and understand how a change in pasture genotype or management impacts red meat production, carbon balance and the whole farming system (ag & rangeland). Interactions between livestock and cropping enterprises should be considered in the mixed farming zones. 2. **New self-regenerating annual legumes** that provide more high-quality biomass over a longer season, are safe for livestock, competitive with undesirable plants (weeds and oestrogenic clovers), fix more nitrogen, are less susceptible to false-breaks and disease/insects, have greater drought resilience, crop herbicide tolerant and seeds are easily harvested for inexpensive regeneration. 3. **Better variety selection and/or novel mixtures of sown annual forages**, for a range of soil types, to deliver high quality winter, spring and conserved feed with lower downside risks such as toxicities or vulnerability to poor seasons. This focusses on species (legumes, forbs, grasses and crops) that are planted each season and not self-regenerating. 4. **Perennial systems for summer/autumn production, shelter and buffering risk associated with poor seasons**. Options include perennial legumes (must be acid tolerant), perennial grasses and shrubs (with annual legumes where appropriate). 5. **Feedbase management tools and information** to optimise feeding value and utilisation through management (ag & rangeland), total grazing pressure

					(rangeland only), nitrogen fixation, conservation, seed harvest and/or regeneration (ag zones only). ***Adoption Gap:*** Some of 5 above may be ready for demonstration through PDS and training. An important priority for rangelands incorporating herd and feral pest management for improved herd productivity, complementary improvement in rangeland condition, animal welfare and enterprise sustainability.
Grassfed Beef	*Beef* *Rank = 1*	WALRC	ongoing	**Optimising southern beef systems with time of calving and stocking rate** The outcome of this priority is a multisite PDS project which demonstrates the value and practicalities of an alternative beef production system based on winter calving. The project should have high visibility in the south-west WA beef production sector.	***Adoption Gap:*** The traditional beef production system in the southern regions of WA is based around calving in Autumn with the objective of turning off a high percentage of calves at the end of spring or soon afterwards. This system results in a relative oversupply of high-quality beef in Spring and a relative scarcity in Autumn and winter months. The remainder are grown out and finished on high quality summer forages or grain, and a small proportion are carried over to be sold as 1-2 year steer beef. Modern consumers demand high quality cuts year-round at an affordable price. Supermarkets issue contracts to meet and capture this demand but there remains a large supply deficit in Autumn and Winter. The Red Sky comparative analysis of beef enterprises concluded that the most important driver of farm business profit is in optimising stocking rate. Herd fertility was probably the next most important factor but of considerably of lower importance than stocking rate. The traditional system cannot optimise stocking rate when peak grazing pressure over calving and early lactation occurs when feed supply is tightest (Autumn). The opportunity here is to examine alternative production systems based around a winter calving and necessarily a suitable stocking rate which reflects the equivalent of an Autumn calving cow with calf at foot. This system would produce more calves per unit of land (Red Sky data) and more beef turnoff into a finishing market which would better deliver on consumer demand. An effective demonstration (PDS) would: • support/enable local champions • focus on the time of calving x stocking rate interaction as the main driver • incorporate other key management decisions to realise benefit (eg time of weaning and stocking rate)

					• have an outcome that is optimising time of calving to maximise profit
Grassfed Beef	*Beef Rank = 2*	WALRC	ongoing	**Reducing reproductive wastage in young bulls due to BHV.**	***R&D Gap:*** There is anecdotal evidence of unexpectedly high incidence of bulls with penis damage (acute ulcerative or pustular balanoposthitis). Affected young bulls are reluctant to serve (presumably painful) and affected bulls are predisposed to secondary issues including physical trauma and secondary infections in the damaged tissues. If infection is allowed to resolve it is not known whether scarring of connective tissues as part of the healing process of the prepuce and glans penis is correlated with poor erectile function, chronic inflammatory penis enlargement or penis deviation. All of these sequelae are observed to have negative impacts on bull service efficiency. It has been suggested that this syndrome may be related to infectious disease, but a causal link has not been established. The role and interactions of bovine herpes viruses (BHV-1 and BHV-5) and/or the bacterium Ureaplasma diversum are not well understood. Veterinary clinical investigations suggest that this problem is Australia-wide. ***Adoption Gap:***
Sheep Productivity Animal Wellbeing	*Sheep Rank = 1* *Animal Wellbeing Rank = 1*	WALRC	Ongoing	**Lamb and ewe survival (**including birth injury, 'big hitters' and understanding new opportunities to reduce ewe mortality**)** About 30% of all lambs born (or 15 million lambs) die within 3 days of birth (perinatal mortality). The most important causes of lamb mortality are birth injury (dystocia) and starvation-mismothering-exposure complex impacting viability of lambs during birth and the first few days of life. The causes of lamb deaths are often complex and multifactorial. Strategies including ewe nutrition profile, management of mob size and provision of shelter in lambing paddocks, and genetics/selection have been demonstrated to improve lamb survival. However,	***R&D Gap:*** A multidisciplinary effort is required to identify drivers of lamb mortality (including abortion and neonatal mortality) and ewe mortality by region, production system, ewe age and genotype to understand the underlying physiology/pathological processes and inform strategies that can be developed and tested at field level. Recommendations need to be optimised within different systems (including for ewe lambs vs mature vs older ewes), genotypes and ewe age groups. There are major gaps (basic and applied research required) in understanding: • how breeding decisions and ewe management may reduce the proportion of ewes and lambs impacted by dystocia and improve the survival of lambs that are born with birth injury

				improvement in lamb survival in response to these strategies is variable, and survival of twin lambs and lambs born to maiden ewes remains challenging even for producers adopting "best practice". Strategies for managing dystocia are generic and don't account for age of ewe at mating or genotype. Abortion and losses between scanning-marking remain a challenge, particularly in maiden ewes. Ewe mortality in the periparturient period also presents challenge for WA producers, with impacts more widely to industry whilst rebuilding national ewe flock. The most recent MLA review of priority diseases (B.AHE.0010) highlighted lack of information and low confidence in the reliability of the mortality data for the majority of important fatal ewe diseases. The recent project "Unlocking the Keys to Ewe survival" included a small number of WA non-Merino flocks and it is not clear how observations and recommendations apply over wider geographical area or to Merino ewes. Ewe and lamb mortality remains an animal welfare issue over which the industry does not have scientific control. A recent review of national sheep reproduction rates and lamb survival undertaken for Sheep Producers Australia indicated that reducing current level of lamb losses by half would result in an annual return of $750 million. Dystocia is estimated to reduce national farm profit by $780 million per year or $23.00 per ewe joined, with approximately 7.7 million lamb deaths and 297,500 ewe deaths per year based on national flock of 38 million breeding ewes (L.LS.0027).	• Ewe mortality rates and main causes of Merino ewe mortality in WA Mediterranean/mixed farming systems. This lack of knowledge means that while risk factors can be identified, there is limited evidence to support current recommendations, and current recommendations are generic (not specific to production system, genotype, age group or litter size/birth type). ***Adoption Gaps:*** Propose new or modified interventions to reduce birth injury in lambs and enhance survival of the dam and lamb. Recommendations should account for overlay between genetics, nutrition, and management. Quantify Merino ewe mortality over lambing period and the important causes of Merino ewe mortality in Mediterranean environments to inform ewe and lamb survival benchmarks and extension/adoption programs that will reduce ewe mortality.
Sheep Productivity	*Sheep Rank = 2*	WALRC	Ongoing	**Are big ewes more profitable than small ones?** Producers want clear evidence of the relative efficiency (feed intake per unit of liveweight) of small v large genetic size sheep. The primary measure of efficiency at	***R&D Gap:*** Producers are still not able to select animals for per hectare production accounting for intake (and stocking rate) efficiency. Some of this will be answered by AWI's GEPEP project. However, measurement of intake remains

				enterprise level should be output per hectare over the average weight range of the mature breeding females. A range of traits could be measured in parallel within this work, eg growth pathway, body composition and reproduction. A secondary outcome is practical measurements of ewe intake, off pasture, such that derived metabolic efficiency traits can be inserted into genetic selection indexes and therefore more efficient animals can be selected at the desired liveweight.	problematic for grazing livestock and limits ability to select animals that are more efficient and can be managed at higher sticking rates. ***Adoption Gap:*** Demonstration of how to select and breed sheep that are more efficient using existing Sheep Genetics tools.
Sheep Productivity	*Sheep Rank = 3*	WALRC	New	**Maintaining eating quality in productive systems** Current sheep management recommendations are largely based on optimising quantity of product (e.g number of lambs or kg saleable meat) without consideration of impacts for meat quality or value. Projects exploring strategies to increase productivity without compromising value are warranted, with inclusion of impacts on meat eating quality when selecting and managing sheep for increased production.	***R&D Gap:*** Existing and future projects focussed on genetic and management strategies to increase production should include assessment of impact on meat eating quality to ensure product value along entire supply chain is not compromised. ***Adoption Gap:*** Demonstration of tools to breed, feed and manage sheep that increase productivity without compromising value of meat and wool.
Animal Wellbeing	*Animal Wellbeing Rank = 2*	WALRC	ongoing	**Transitioning to a non-mulesed flock** Adoption non-mulesed flocks is driven by the market whereby tools are available for producers to adopt when they want/have to. Current barriers to adoption include docking technique and managing dag and scouring.	***R&D Gap:*** ***Adoption Gap:*** Demonstration of tools (genetic and management) and technologies to run a non-mulesed flock. Including: • Best practice docking - including removing wool from tip of tail • Managing scouring/dag • Better understanding longer term genetics opportunities
Sustainability and CN30	*Sustainability & CN30 Rank = 1*	WALRC	Ongoing	**Technology development and application to improve productivity and sustainability of livestock businesses** Levy payers have tools to support remote analysis of	**R&D Gap:** Improved remote sensing tools with higher resolution and ground-truthed data and then development of tools for practical/tactical decisions on farm.

				pasture and forage growth for better estimation of emissions and feed intake	Pastures from Space, Pastoral Remote Sensing and EID are examples which are available, but they are not utilised by the majority of producers. Application functionality and practicality are likely impediments and there is scope for improvement and further investment in R&D. With the new PfS and PRS tools, we need to build algorithms that are ground-truthed for pasture and forage systems other than annual mixed pastures with a grass and clover base to increase their value. Quantify the value of VRT on grazing strategies and fertiliser application in broadacre livestock systems. **Adoption Gap:** There has been rapid development in artificial intelligence (AI), sensor techniques and resolution, (fixed, mobile (animal, drone) and remote and satellite), data collection, collation and analyses. Considerable scope exists for extension of emerging and existing technologies in farm and pastoral livestock enterprises.
Sustainability and CN30	*Sustainability & CN30 Rank = 2*	WALRC	Ongoing	**The carbon footprint of our business** Improved practical understanding by levy payers about carbon emissions on their property – based on real numbers rather than models to inform about emissions. Producers understand the risks and opportunities around GHG emissions intensity and total emissions of their product on access to markets and are able to communicate their carbon position to allow participation in CN or low Carbon brands.	**R&D Gap:** We don't have a good handle on emissions in the semi-arid region and agricultural region. R&D is required to collect real numbers for emissions and sequestration instead of relying on models. Model development is required for semi-arid pastoral rangelands as generic models do not apply. We don't have any good data on the impact of pastures and forages as part of a grazing system on livestock emissions in a mixed farm. **Adoption Gap:** Adoption program with producers to get a baseline of their farm system and an understanding of the contributors and hot spots so that decisions can be made on where to go regarding emission reduction and how it fits into business. An adoption program in whole or part which has four main outcomes: 1. Trains producers about the sources of carbon emissions and sequestration – improved carbon literacy 2. Has producers perform a carbon account for their businesses 3. Provides on-farm options to mitigation of nett emission of carbon ie: how many hectares of eligible vegetation and what is the renewal timeline; integration of shrubs and use of methanogenic 4. Creates tools and calculators that deal with mixed farms.
Sheep Productivity	No	WALRC	Ongoing	**Virtual fencing in farm systems evaluation** Virtual fencing provides opportunities for producers to:	**R&D Gap:** Ongoing work by manufacturers/private industry.

Grassfed Beef *Sustainable Feedbase Resources*				• Subdivide large paddocks into smaller management unity to temporarily protect newly sown/established species • Establish exclusion zones in large paddocks to prevent ongoing overgrazing or to graze out/control undesirable species • Subdivide to optimise lambing mob size/location and to assist with lambing of small mobs in single sire mating groups • Modify behaviour to enhance adaption of rangeland cattle brought into backgrounding situations. Overall, virtual fencing will allow for improved pasture utilisation efficiency whilst also maximising pasture growth and livestock production (including post weaning lamb growth, wool production per hectare)	Still a broader priority with gaps, but being addressed commercially **Adoption Gap:**
Grassfed Beef	No	WALRC	Ongoing	**Are big cows more profitable than small ones?** Producers want clear evidence of the relative efficiency (feed intake per unit of liveweight) of small v large genetic size beef herds. The primary measure of efficiency at enterprise level should be output per hectare over the average weight range of the mature breeding females.	**R&D Gap:** Measurement of feed intake in grazing conditions – this is taking place – but waiting for results using tags and collars **Adoption Gap:** Demonstrations of the use of BREEDPLAN efficiency traits and the impact of genetic gain on farm productivity in different production systems
Health and Welfare	Emerging	WALRC	Emerging	**Pneumonia in WA sheep** Pneumonia is an 'emerging' issue in WA sheep, largely due to increased producer awareness and advances in diagnostics and monitoring demonstrating that Mycoplasma ovipneumoniae is common and widespread in WA sheep and associated with on-farm mortality and significant lung pathology (pleurisy) detected at slaughter. The epidemiology of Mycoplasma ovipneumoniae in Australian sheep is not well studied, and the number of farms and animals impacted, and consequences for productivity, eating quality and animal welfare cannot	**R&D Gap:** R&D is required to define the epidemiology of pneumonia in WA sheep: • the number of farms and animals impacted, and • the impact on productivity. Strategies to prevent and manage pneumonia outbreaks need to be developed. **Adoption Gap:**

				be accurately quantified. Existing recommendations to prevent, treat or manage outbreaks are generic, without strong evidence demonstrating efficacy across different production systems. Existing projects by MLA and Animal Health Australia may include recommendations for further R&D	
Health and Welfare	No – but requires monitoring	WALRC	Monitoring	**Pain Relief** Pain relief for marking procedures (docking, castration, mulesing) remains industry challenge, with implications for animal welfare and market access. Existing products are available that have variable efficacy and adoption. Development of products and/or methods of delivery that have better efficacy, efficiency and safety will drive improved adoption.	**R&D Gap** Improved efficacy, efficiency and safety of pain relief for painful husbandry procedures in sheep, cattle and goats **Adoption Gap:** Extension of tools and management practices available for effective pain relief in both the sheep and cattle industries.