1. WALRC RD&A priorities

Table 1: Identify research, development or adoption gaps, activities, and strategies to achieve the desired outcome/s.

MLA Program Area	Priority Rank	Committee origin	New or Ongoing Priority? Monitoring or emerging?	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.***
Animal Wellbeing	1	WALRC	New	Industry, research institutions and those involved in priority setting have access to data about emerging diseases and changes in disease distribution *The outcome sought is access to current data that is anonymised and aggregated (to maintain confidentiality) to identify emerging animal health issues and better inform setting of research priorities in animal disease space. At present, most data is data retrospective or anecdotal, and this is a barrier to agile response to emerging or changed disease trends that could be addressed with targeted R&D*	**Development Gap:** • Data on endemic disease trends is closely held/confidential by the states; • Multiple stakeholders working surveillance and Emergency Animal Disease planning • Endemic disease surveillance and reporting data that could be aggregated and anonymised to identify emerging trends and inform research priorities is challenging to access; • Confidentiality prevents information exchange and there are opportunities lost to collaborate to identify emerging issues that warrant investment in research or extension, and respond to these in a timely way

Animal Wellbeing	2	WALRC	New	In light of changes distribution of existing diseases, biosecurity threats and increasing resistance to animal health treatments, *we seek a coordinated direction for sustainable, effective disease control and regional biosecurity.*	**Gaps:** • R&D (but mostly E) for strategies for sustainable control of parasites and infectious diseases (including vaccination strategies and sustainable use of antimicrobials), and monitoring of treatment efficacy for key animal health treatments • Integrated pest/disease management strategies that consider production system and changes in disease/pest distribution • Skills gap – insufficient trained professionals available to provide producers with effective/sustainable animal health plans specific to their enterprise. Challenge is both in training, then retention of expertise in industry

Grassfed Beef Productivity	1	WALRC	New	*The outcome sought is validated Beef Cattle Modelling Systems for the Southern Rangelands* Context: Southern Rangelands has recently transitioned from primarily sheep systems to predominantly beef cattle (only in the last decade). It is a significantly different environment to northern beef systems where modelling programs	**R&D Gap:** • Southern Rangelands – understanding the return on investment (ROI) of different production options • Unique production systems (range of) • Economic and natural capital evaluation of alternative systems • Validating carbon accounting for the southern rangelands to determine if there are genuine market opportunities for low carbon beef • Economic evaluation of cattle breeds, including crossbreeding – productivity (taking into account hybrid vigour), ROI and environmental resilience.

				are well underway. DPIRD has commenced a bioeconomic model for a system that is focused on Rangelands revitalisation with lower stocking rates, heavier weight turn off and improved fertility, but there is opportunity for significant expansion and validation of these works.	**Adoption Gap:** • Model/decision support tools that inform decision making at enterprise/regional level, whole farm modelling and inclusive of different markets and targets. <u>Linkages to last year's priorities:</u> **Beef #1 - 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.
Grassfed Beef Productivity *Note Linkages with Feedbase*	2	WALRC	New	**<u>Grazing Management:</u>** The outcomes sought are productivity gains particularly in drying climate.	**R&D Gap:** • Tools or information to assist producers to understand the quantity and quality of feed and to enable feed budgeting, supplementation decisions and herd planning. • The CIBO Labs predictions of biomass are considered inaccurate in Western Australia. They don't provide information on plant quality. • What tools are available, how do they interface and what is missing? What information does the industry need to know to optimise pasture and forage utilisation and make timely decisions? **Adoption Gap:** • Advances in "Kiwi-tech" ie systems/tools that intensify grazing management to improve pasture utilisation. Is there something that is being done elsewhere that could be trialled by WA producers? • Would more ground truthing of CIBO Labs predictions improve accuracy for WA? If so, can we get more producers involved. • *(new based on development of Livestock Matters Manypeaks)*.

					• A better understanding of the role of pit silage compared to plastic-wrapped. Challenges with logistics balanced against storage timeframes. Is it better to use sown forages or mixed swards, monocultures or diverse mixtures?
Sheep productivity Do we need a targets for 2035 and is it more than just Merinos? TBC	1	WALRC	Ongoing	*We seek to understand why we still have only 70 to 75% lamb survival and 85 to 95% weaning rate in WA Merinos?* *We want to know what control points, management and production factors will provide the greatest return for effort for individual farmers?* Context: The causes of lamb deaths are complex but adoption of strategies including ram and ewe selection, more precise management of ewe condition score profile during pregnancy, management of feed on offer and mob size during lambing, and provision of shelter can improve survival rates for twin-born lambs to 85-90%. Likewise, individual producers in WA are achieving reproductive rates in Merinos of 170-180%. Recent economic	**R&D Gap:** Most of the 'know-how' needed to achieve weaning rates of 130-140% in Merinos already exists. Implementation of this 'know-how' into mixed farming systems which are dominated by cropping is the major impediment to increasing lamb survival to X and weaning rates to Y by 2035. A greater focus is needed on the ease with which a management change to increase lamb survival and weaning rate can be achieved whilst also reducing risks/increasing resilience of the farming system. Further research is needed to: (i) Benchmark current levels of production and management of adult ewes on 50-100 farms across different regions of WA over 2-3 years. This work would identify which management interventions will have the greatest impacts on lamb survival and weaning rates for individual farmers. The process would also identify barriers to adoption and enabling technologies to increase adoption of interventions known to improve lamb survival, including barriers to providing the nutrition (perennial pastures/annual pastures/grazing crops/pasture management) to meet the needs of twin and triplet bearing ewes. This R&D gap can only be addressed from working with the spectrum of producers including a majority that do not pregnancy scan. (ii) Develop and demonstrate technologies and processes to enable more producers to implement management changes to improve lamb survival and weaning rates.

				analysis suggests marginal if any benefits to farm profit from targeting further increases in reproductive rates, due to increased prevalence of triplet born lambs when scanning rates exceed 170-180% and low survival rates of triplet-born lambs.	Adoption Gap: Active participation in review of all MLA extension and adoption programs focused on sheep reproduction to ensure 'Fit for purpose' for WA sheep producers. This includes T90, BWFW, Profitable Grazing Systems, Lifting Lamb Survival etc etc .
Sheep Productivity	2	WALRC	new	*The deliverable sought here is a whole-of-farm-system technology package that enables both remote monitoring and efficient management. A fully integrated package could deliver remote monitoring and management of:* • *FOO – combining NDVI biomass; soil moisture, rainfall/temperature data to predict PGR and quality and how that links to weight gain/condition score* • *Water – tank levels, tank flow, remote activation of water*	**R&D Gap** Sheep production requires significant investment in labour compared to cropping enterprises which results in reluctancy to put more resources into the enterprise to increase productivity. There have been advances in technology to increase efficiencies, however, although a lot of these technologies are available as standalone, having them as a suite within one operating platform that collates data on a mob/paddock basis would enable a stock health/production check to be done in less than 5 minutes a mob. An opportunity to create desirable ranges for each data set and generate warnings when upper and lower limits are reached could be achieved. Providing an interpretation of the combined data and recommended management action is also a gap.

				• *Animal health – geolocate, WOW; condition score equivalents; heart and respiration rate* • *Animal management – geolocation, virtual fencing and time of lambing sensors*	
Feedbase Production	FP Rank = 1	WALRC		**<u>Feedbase and mixed farming systems</u>** Outcome being sought: New plants, tools and practices to optimise nutrient supply for sheep and whole-farm profitability in mediterranean climate areas. Note mediterranean areas are at the forefront of climate change threats and are challenged by changes to live export.	**R&D Gap:** • Novel research to develop forage systems to fill the major nutrient gaps (energy, protein, vitamins and minerals) and reduce risk associated with climatic variability and drought. This includes perennial systems for land that has marginal cropping value, forage conservation and crop grazing strategies. • Pasture decline has occurred in the high and medium rainfall zones. Is this due to a change in the biological system (plants/disease/rhizobia) or management? How can the new hardseeded pasture legumes be used to improve productivity and reduce climatic risk? • Tools to predict biomass (and biomass quality?) that are accurate in the southern rangelands. If CIBO Labs is the best option, more ground truthing to improve the predictions. Can the tool be used to measure ground cover, carbon and other metrics that are associated with nature positive systems? Is CIBO the best option for WA? • Increasing diversity within the feedbase often leads to increasing management complexity. However, there is emerging evidence that individual animal performance can be improved when they have access to plant mixtures and can choose dietary components. With a focus on the low rainfall zone, can we improve productivity and profitability of sheep production with

					diverse mixtures as compared to current systems of transitioning sheep between monocultures? **Adoption Gap:** • As per above Cibo Ground truthing. • Pit silage is massively underdone in WA and offers an opportunity to reduce risk in poor seasons. More could be done to encourage adoption, especially in the mixed farming zones.
Feedbase Production	FP Rank = 2	WALRC		**<u>Feedbase and mixed farming systems</u>** Better integration of livestock and crop enterprises within mixed farming systems.	**R&D Gap:** • Novel research to understand opportunities for crop grazing – across crop species and rainfall zones. This is especially pertinent in the Mediterranean zones where the season is abrupt and spring rainfall may constrain the ability of the crop to reach yield potential. • Opportunity to value-add to crop improvement and variety trials to select dual-purpose crops that fill the winter feed gap while annual pastures get away. • Better understanding of how animals can be transitioned from dry pastures to crop monocultures without production and health issues. **Adoption Gap:** • Crop grazing in the low and medium rainfall zones. How much benefit can be achieved for the sheep enterprise and what is the impact on crop productivity?
Environmental Sustainability (On-farm)	ES Rank = 1	WALRC	New	Our outcome being sought is the science so that producers have confidence that carbon calculators and baselines provide an accurate assessment on which key production decisions can be made.	**R&D Gap:** • Validating/ground truthing CIBO data • Identifying key indicator species in natural pastures (Southern Rangelands) • Developing automated technology to measure natural capital and methane!

				Producers insist it is critical we have the science that informs the policy in relation to how methane emissions are calculated/attributed to livestock systems in the current carbon accounting models.	• Linking healthy environments to production systems to quality meat (more than just carbon/methane) **Adoption Gap:** • Understand "whole-of-system" – plant/soil/animal/carbon/nitrogen/human/water. • Acknowledging ungrazed pastures/forages degrade and emit CO2 and CH3 when not utilised, plus its effect on resilient livestock production systems. Oxidised plants do not fix carbon. • Use it or lose it. <u>Linkages to last year's priorities:</u> **Sustainability #1 Technology development and application to improve productivity and sustainability of livestock businesses.**
Environmental Sustainability (On-farm)	1	WALRC	New	**<u>Reducing methane emissions:</u>** **<u>Key outcomes sought are:</u>** 1. *Determine actual livestock emissions on existing forages and pastures and identify forages with low emissions (anti-methanogenic) value;*	**R&D Gap:** • 1A Define the production systems that need to be baselined in order to represent WA industry more broadly a. Represent range of soil type and rainfall – biogeographic zones b. Enterprise mixes (especially mixed farming systems) c. Seasonal variation d. How this changes with supplementary feeding scenarios (grain vs pasture) • 1B. Quantify emissions for different feed base options across growing season that are relevant to WA production systems/enterprise mix • 2. There is intention to have a methane breeding value by 2026 = but there are only 4 WA farms involved at the moment. Involvement

				2. *Undertake genetic screening for low methane animals and develop sire breeding values for use by industry;*	of more WA farms is critical for an extension/adoption/believability factor. (We need to demonstrate the ASBV is relevant to WA) While this service is being provided to some extent – but we need to ensure there is ample awareness/access so every new product can be independently tested
				3. *Run 'whole-of-farm' trials to design farming system solutions that decrease methane and increase production efficiency in sheep and cattle enterprises.*	Trials need to be on producer properties to enable peer to peer learning and increase adoption
				4. *Industry to have ready access to results from due diligence trials (soil contamination, animal health, impact on reproduction, early-life programming) of emerging feed additives in order to make informed and independent purchasing decisions*	

Other		*WALRC*		*The outcome sought is Assistance to WA Sheep producers with key decision making around flock ratio, composition, breed and management in response to predicted end of live export*	***RD&E Gap:*** In what is an unprecedented situation there is a lack of simple decision support tools to model sheep system changes and the impact that has across farm to ensure the response to the changing market landscape is optimal. Current modelling systems require more on-farm data to calibrate the use of stubble and inclusion of pasture to better represent the feed budget.

Other (Genetics)	*Genetics*	*WALRC*		***The genetics outcome sought are:***
				• *DNA markers and development of EBVs and ASBVs for a range of production traits:*
				  • *Methane production*
				  • *Flight scores in sheep*
				  • *Worm resistance*
				  • *Methane and NFI (Net Feed Intake)*
				  • *Longevity*
				• *Crossbreeding for profit*
				• *Sexed Semen in FTAI Programs – heifers from heifers*	

Other (Nutrition and Eating Quality)	*Eating Quality*			***Nutrition and Eating Quality*** • *Measuring the nutrient density of red meat in different production systems (Debbie).*	