

WALRC Priorities submitted to MLA FY 21-22

About this document

This document summarises the work of WALRC in identifying and collating production limiting issues from producers and consultants in the southern half of WA, for the 12 months up to June 2021.

WALRC has considered the issues against the current research and extension work underway in that field and proposed a series of research and extension activities for funding that it considers would represent an appropriate response to the issue at hand.

The result of this work is a rigorously reviewed list of described priorities on the pages following. WALRC proposes that if funded, these 18 priorities will become discrete pieces of research and extension work that would deliver high value to WA red meat producers.

The listing was finalised at the annual WALRC Priority Setting Workshop in August 2021, attended by the full WALRC Council.

This document is current as at August 30, 2021

WALRC Priorities for 2021-2022

A summary of the WALRC priority setting process

1. Feedback and issues have been collected from nine WALRC forums, industry forums and events in which WALRC participated throughout the FY 20-21. In addition, we have hosted two project ground-truther events with Tier 1 partners, which provided valuable insights. We have also drawn on virtual discussions via our WALRC Twitter feed. With the growing reputation and profile of WALRC, we now also find that levy payers 'ring and email us direct' with their input and ideas they want to take forward.
2. This booklet contains the final 21-22 priorities in order of rank by the full Council. The Priority number/code in the top left box is the year it was first composed and an ID number. ***The scoring and rank appear at the bottom of each priority.***
3. Each WALRC member had the opportunity to add a priority to the matrix for consideration. In order for a draft priority to be added it had to be 'distinctly different' from any of those listed here and importantly must be referable to the consolidated issues collected during the previous 12 months. One additional priority was submitted this year.
4. Each priority listed was discussed by the group during two workshop sessions. There were many 'add/refine/edit/change' opportunities throughout the group discussion and live editing to a "close-to-final" form for each priority occurred.
5. WALRC members then voted to identify their preferred top seven priority projects. That is, each council member had seven votes to allocate.
6. We added up individuals top seven R&D priorities into a final score and ranking. The amalgamation of this data provided a whole-of-group outcome by the end of the meeting, which automatically becomes the recommendations to MLA.
7. We have sent to MLA the 18 top ranked Priorities. These scored 3 points or more.
8. A subset of the priorities which are primarily of a PDS (adoption) nature will be segregated to form our PDS priority list.

Tim Watts
Chair, Western Australian Livestock Research Council
August 2021

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Priority #2021.3	Optimisation of forage crops/phase pastures to Enhance Output and Profit.			
Background/Context	<p>Forage crops have been extensively tried and tested by producers across WA in the last few years. A range of benefits have been recognised which encourage them to continue to trial them including:</p> <ol style="list-style-type: none"> 1. Deferment of regenerating pastures to increase their production over the season (like confinement) 2. Capturing early dry matter production from early rains, assuming when sown early 3. Some forage crops exceed the productivity of self-regenerating pastures in winter. 4. The quality and production of some forage crops contributes to early and/or out of season finishing of beef and lamb. 5. Saving input costs on grain and hay-based supplementation and finishing rations. 6. Weed seed set control for problem paddocks prior to return to crop next season <p>However, the most frequent questions and greatest area of interest to producers is what is the best bet forage crop strategy to suit a production objective (outcome). This has some commonality with the prior “Grain-n-Graze” series, the main novel component is that the focus is on specialty forages with a primary purpose of livestock production, not dual purpose or a primarily grain production outcome.</p>			
Priority Description	<p>A series (geographic) of scientifically run production systems trials which provide measured outputs for a range of forage crop options across the growing season. The interaction between macro and trace element nutrition of the forage plant species and the livestock perspective should also be included in the studies where regionally appropriate.</p> <p>For example: Autumn – compare brassica, vetch, forage oats and grain ration for finishing weaned calves or lambs. Winter - calculate the sustainable stocking rate achieved by forage oats, pasture, vetch and grazed canola (grown for grain).</p> <p>A major outcome from this work would be data which forms the basis of modelling to determine the relative economics of the different forage crop options and where their economic intercepts occur.</p>			
Type of Investment (1-5 stars)	R	D ***	A ***	
Assessment	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs ****	Regional *****	\$100-500k	DRD ***** (drought hub?)
	Long >5yrs	National	\$500k-\$2m *****	Fed
		Global	>\$2m	Private
WALRC Final Score	9			RANK = 1st

Priority #2020.14	Are big cows and ewes more profitable than small ones?			
Background/Context	<p>The advent of EBV's and the use of Breedplan Indices by the seedstock industry has resulted in an increase in growth rates but also an increase in the mature size of females. This increase in mature cow size has increased the maintenance costs of the breeding herd but there does not seem to be any evidence to quantify if the increased maintenance costs are being offset by the increased growth rates and income of sale of larger progeny or not. If you chase all the indices - you end up with is a big cow.</p> <p>Similar debate has waged over many decades in the sheep industry. Are we simply breeding bigger animals which eat more and have no improved efficiency, such that output per hectare is not improving when stocking rate is considered?</p> <p>Are we making genetic progress or simply genetic change without any resulting improvement in profit?</p>			
Priority Description	<p>Producers want clear evidence of the relative efficiency (feed intake per unit of liveweight) of small v large genetic size beef herds and sheep flocks. The primary measure of efficiency at enterprise level should be output per hectare over the average weight range of the mature breeding females.</p> <p>A range of traits could be measured in parallel within this work, eg growth pathway, body composition, milking ability and reproduction.</p> <p>A secondary outcome is practical measurements of cow and 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.</p>			
Type of Investment (1-5 stars)	R	D *****	A	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC
	Medium 2-5yrs *****	Regional	\$100-500k	DRD
	Long >5yrs	National *****	\$500k-\$2m *****	Fed
		Global	>\$2m	Private
WALRC Final Score	9			RANK = 1st

Priority #2020.4	Reducing reproductive wastage in young bulls due to BHV.			
Background/Context	<p>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.</p> <p>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 <i>Ureaplasma diversum</i> are not well understood.</p> <p>Veterinary clinical investigations suggest that this problem is Australia-wide.</p>			
Priority Description	<p>We suggest controlled studies in bulls to evaluate the efficacy of the currently available BHV vaccines in reducing incidence and severity of balanoposthitis.</p> <p>This priority is subject to an MDC application to encourage industry involvement from pharmaceutical industry and/or expert researchers in this discipline.</p>			
Type of Investment (1-5 stars)	R	D	A	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	
	Medium 2-5yrs *****	Regional	\$100-500k	DRD
	Long >5yrs	National *****	\$500k-\$2m *****	Fed
		Global	>\$2m	Private
WALRC Final Score	9			RANK = 1st

Priority #2021.1	A broadly adapted legume to replace Dalkeith sub clover in the Med feedbase			
Background/Context	Dalkeith Clover has been the single most important pasture legume of the mixed farming system in southwestern Australia for nearly 40 years. Most renovated pastures have a component of Dalkeith in them, and “certified” and other seed sales of Dalkeith vastly outweigh any other variety. Most other species developed in the time since Dalkeith have smaller roles in the feedbase and are suited either to short term pasture leys (high cropping intensity), environmental extremes on the farm or to particular production outcomes (eg:hay). It is long overdue that strategic investment in new pasture species/cultivars be made that results in a more productive broadly adapted legume to underpin the pasture feedbase of the medium to higher rainfall mixed farming regions in the southwest of WA.			
Priority Description	<p>The major outcome is a new feedbase legume with broad adaptation for the Mediterranean regions of Australia which will underpin grassfed livestock production as a profitable component of the mixed farming system. Feed quality and quantity is a critical consideration; so too is general resilience/persistence and palatability.</p> <p>The priority is R&D which results in a broadly adapted pasture feedbase legume suited to the south west of western Australia and other regions with a similar Mediterranean climate. In particular the new legume should significantly exceed the dry matter production of Dalkeith on a whole of growing season basis and addresses its major weaknesses, which include:</p> <ul style="list-style-type: none"> • Susceptibility to false breaks resulting in low plant density and poor early season production • Poor drought resilience. (We need to identify and select traits which promote plant survival and dry matter production during adverse seasonal conditions). • Shallow roots. (The need to improve water use and water use efficiency) • Fails to out-compete over the long term, the oestrogenic strains introduced to WA in the 1930’s. • Susceptible to insect attack • Susceptible to a number of viral and mycorrhizal diseases rendering it unsuitable for some districts • Poor Seed set relative to other cultivars and species. • Seed production/harvesting is environmentally risky and not suited to some soil types and districts. <p>The commercialisation model for the new variety(s) arising from this work should be designed to ensure maximum adoption (not a weakness of Dalkeith per se, but an adoption barrier for many legume cultivars since then).</p>			
Type of Investment (1-5 stars)	R ***	D ***	A *	
Assessment	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs	Regional *****	\$100-500k	DRD *****
	Long >5yrs *****	National ***	\$500k-\$2m	Fed
		Global	>\$2m *****	Private *****
WALRC Final Score	8			Rank = 4th

Priority #2021.2	Optimisation of Pasture Production in our Mediterranean Environment			
Background/Context	<p>Set stocking or minor modifications thereof is the most common livestock production practice in WA. The reasons for this are complex but probably centred around large/extensive scale of operation and limited skilled labour to intensively manage pastures, a long history of subclover as the primary feedbase which performs relatively well under continuous grazing, and long seasonal drought during which pasture management has limited impact on pasture production in the next growing season. Many of the pasture species selected, bred, and commercialised in the past few decades are not suited to set stocking and as a consequence it challenges the skills of producers to learn how to manage them. A further outcome has been limited adoption of these pasture types despite their obvious potential. Included in this group are serradellas, biserrula, chicory, plantain, sulla and even lucerne (for which there is significant information) to name a few. Essentially all of the aerial seeding legumes and perennial herbs, brassicas and grasses (including C4) have limited information on which to base optimised grazing management. Productivity of Serradellas is known to be potentially quite high, to exceed subclover and has potential to extend longer into the spring months. However it does not perform well in higher rainfall and stocking rate scenarios where grazing intensity is higher for much of the growing season with only scant attention to stocking decisions eg: FOO alone. It is well known in the dairy industry that grazing of ryegrass must be rotational for optimal production, of frequent interval (growth of 3 leaves), and that the grazing period be short (3 days or less) to allow for plant recovery. And beyond this, could subclover and ryegrass production be significantly enhanced through some form of controlled grazing management system?</p>			
Priority Description	<p>A multidisciplinary grazing management program of work which optimises the productivity and/or output from all major pasture species through an improved understanding of the relationships between plant growth(phenology) and their response to grazing. The output would be the development of grazing indicators which are preferably measured and applied in the field. The grazing indicators should guide livestock/pasture managers on:</p> <ul style="list-style-type: none"> • grazing commencement - timing of grazing relative to plant growth stage, FOO or some other cue • Intensity of grazing and expected livestock performance • Longevity of grazing interval • When grazing should terminate • Non grazing interval – guidance/predictors of plant recovery • Quantified lock up guidelines to meet a range of production outcomes – hay, seed set, green manuring, summer biomass accumulation, summer survival (perennials) <p>A thorough literature review by species/cultivar would be a normal part of each project under this priority to identify specific gaps in knowledge and guide researchers in study design.</p>			
Type of Investment (1-5 stars)	R **	D *****	A ***	
Assessment	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs	Regional ***	\$100-500k	DRD *****
	Long >5yrs *****	National ***	\$500k-\$2m	Fed
		Global	>\$2m *****	Private
WALRC Final Score	8			Rank = 4th

Priority #2020.9	The carbon footprint of our business			
Background/Context	To the majority of producers the gross and nett carbon emissions of their livestock business is a theoretical and nefarious number. As we move towards an industry goal of carbon neutrality by 2030, we must improve the practical understanding of levy payers about carbon emissions.			
Priority Description	An adoption program in whole or part which has four main outcomes: <ul style="list-style-type: none"> 1. Trains producers about the sources of carbon emissions and sequestration. 2. Has producers perform a carbon account for their pastoral 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 4. Creates Tools and calculators that deal with mixed farms. <p>We note that this raises the need to re- examine what improvements can be done to a carbon audit over time to better capture true emissions status.</p>			
Type of Investment (1-5 stars)	R	D	A *****	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs *****	Local	<\$100k	AWI/GRDC
	Medium 2-5yrs	Regional	\$100-500k *****	DRD
	Long >5yrs	National *****	\$500k-\$2m	Fed *****
		Global	>\$2m	Private
WALRC Final Score	8			RANK = 4th

Priority #2020.12	Lamb Survival – What are the big hitters?			
Background/Context	<p>About 30% of all lambs born (or 15 million lambs) die within 3 days of birth (perinatal mortality). The largest contributor to these deaths arise from the continuum of the starvation/mismothering/exposure complex overlaid with variable effects of dystocia.</p> <p>This is an emerging 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 losses by half would result in an annual return of \$750 million.</p> <p>Current and recent research outcomes have progressed in only small increments (1 and 2%ers) for producers that are otherwise already adopting ‘best practice’ recommendations, leaving the largest sources of lamb loss accounted for in “cause of loss” statistics but not recoverable with existing knowledge or technologies. Provision of shelter is known to reduce perinatal lamb loss by up to 50%. In the broader mixed farming context the previous research can inform effort to update and optimise new ways to provide such shelter.</p>			
Priority Description	<p>A multidisciplinary effort required to identify source drivers of lamb loss by region and production system, then understand underlying physiology/pathological processes such that possible solutions can be developed and tested at field level. This is a long-term multidisciplinary R&D program.</p> <p>Applied research in the modern mixed farming context to optimise the provision of shelter to reduce perinatal loss in lambs.</p>			
Type of Investment (1-5 stars)	R ****	D **	A **	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs	Regional	\$100-500k	DRD *****
	Long >5yrs *****	National *****	\$500k-\$2m	Fed *****
		Global	>\$2m *****	Private
WALRC Final Score	8			RANK = 4th

Priority #2020.6	Virtual fencing – developing on-farm tactics to make it pay its way in WA			
Background/Context	<p>Livestock producers have a high level of awareness and are looking forward to the management opportunities that virtual fencing brings to livestock production. Virtual fencing has been raised at most forums conducted by WALRC in the past 3 years. The research into virtual fencing for livestock has reached a point where its application and evaluation on commercial properties is required. It also opens opportunities to control animals in new ways in research projects.</p> <p>Virtual fencing for sheep and cattle are at different stages of. With cattle, the work is around proof of commercial use; with sheep, the work is more the engineering and delivery method of the technology and understanding the differences in behaviour ie breed, age, sex, lambing status.</p>			
Priority Description	<p>Field based research to evaluate and quantify the capability and benefits in livestock production from virtual fencing. The uses of the technology include the following:</p> <ol style="list-style-type: none"> 1. Subdivision of large paddocks into smaller management units to temporarily protect newly sown/established pastures, riparian zones, shelter shrubs or remnant vegetation. 2. Exclusion zones in large paddocks to prevent overgrazing or to graze out/control undesirable species 3. Subdivision to optimise lambing mobs size/location and to assist lambing of small mobs in single sire mating groups. 4. Modifying behaviour to enhance adaptation of rangeland cattle brought into backgrounding situations. 5. Improve pasture utilisation efficiency whilst also maximising pasture growth and livestock production (post weaning lamb growth, wool production per hectare). 			
Type of Investment (1-5 stars)	R	D *****	A *****	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs *****	Regional *****	\$100-500k *****	DRD
	Long >5yrs	National	\$500k-\$2m	Fed
		Global	>\$2m	Private *****
WALRC Final Score	7			RANK = 8th

Priority #2020.1	Building a better feedbase for the Mediterranean zone			
Background/Context	<p>The Mediterranean climate zone of in Australia is characterized by pasture, crop and forage growth patterns which are highly seasonal and have a major impact on stocking rate decisions. There are production/management and welfare challenges associated with the annual feed gap in autumn/winter, a spring surplus to manage, unreliable summer rainfall and climate change is reducing feed supply predictability.</p> <p>These climate challenges and large gaps in knowledge means utilization efficiency of pasture is low and therefore the opportunity cost is very large (stocking rates are generally aligned to a decile 2-3 rainfall year). Despite this, there is almost universal understanding and acceptance of the base concept that stocking rate is the productivity driver of pasture-based livestock businesses.</p> <p>Producers are concerned about the lack of ongoing new investment in robust, productive, high quality pasture and forage options and systems for higher red meat production efficiency. In addition, they are recognizing the imbalance in striving for increased production via reproductive output due to its higher input cost as it elevates the business risk profile of a Mediterranean pasture-based production system in the absence of more dry matter.</p> <p>Feedbase strategies that address the feed gap and early winter production will also assist producers managing drought and a variable climate.</p> <p>There is widespread support for reintroduction of well adapted annual ryegrass as it provides good early season feed, especially in low rainfall zones. However, ARGT risk is high and there are issues with weed management within cropping rotations.</p>			
Priority Description	<p>Producers want options to broaden feed supply and address the autumn/winter nutrient gap as this allows them to increase overall stocking rates, reduce risk and improve profitability. Priorities for research include:</p> <ul style="list-style-type: none"> • A systems-based approach to understanding the existing feedbase and identify targets for improvement, • Better varieties or novel mixtures for a range of soil types, which deliver higher DM production of high quality without downside risks such as toxicities. • Better perennial species for out of season production and buffering risk associated with poor seasons. Within the mixed crop/livestock zones, perennials have lowest opportunity cost on soils that are marginal for cropping. • Better forage crop systems. • Options to deliver ryegrass pastures that are ARGT safe and not a weed risk for cereal crops. 			
Type of Investment (1-5 stars)	R ***	D ***	A ***	
Assessment	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs	Regional ***	\$100-500k	DRD *****
	Long >5yrs *****	National ***	\$500k-\$2m	Fed
		Global	>\$2m *****	Private
WALRC Final Score	6			Rank = 9th

Priority #2021.7	Technology Development and Application to Improve Productivity and Sustainability of Livestock Businesses to meet CN2030 targets			
Background/Context	<p>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 RD&A.</p> <p>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.</p> <p>Considerable scope exists for application of emerging and existing technologies in farm and pastoral livestock enterprises.</p>			
Priority Description	<p>The outcome is systematic evaluation of emerging technologies to identify their potential applications in the farming and pastoral livestock sectors. The outputs of this program would be based in proprietary information comprising intellectual property, know-how and/or knowledge which is enabling for subsequent R,D&A projects to exploit to achieve their project objectives.</p> <p>Possible Projects within this priority:</p> <ol style="list-style-type: none"> 1. Correlate historic (from 1988) satellite remotely sensed cover indices on a land unit (pasture community) basis with management (grazing pressure), seasonal condition and cover response, and resource condition (pasture composition and soil). 2. Stereo coverage with drone-based cameras and sensors and integrated AI which enables identification of individual plants within complex rangeland pasture communities. Develop algorithms which track change in biomass and demography of individual plant species and correlate with livestock grazing and carbon sequestered or lost above ground and in soil. Investigate whether a species grazed profile can be established (and a livestock methane emissions profile investigated). 3. RDA in conjunction with Southern Rangelands Pastoral Alliance and DPIRD supported Southern Rangelands Revitalisation Program which have objectives of increasing rainfall use efficiency on degraded rangelands through measurement and control of total grazing pressure; improved management and productivity of livestock and re-hydration of pastoral lands through predictive modelling and monitoring of erosion. 			
Type of Investment (1-5 stars)	R	D *****	A	
Assessment	Longevity	Impact **	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs	Regional ***	\$100-500k	DRD
	Long >5yrs	National ***	\$500k-\$2m *****	Fed *****
		Global	>\$2m	Private *****
WALRC Final Score	6			Rank = 9th

Priority #2021.6	Alternative Cow Production Systems for more Profit and better meet Market demands			
Background/Context	<p>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.</p> <p>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.</p>			
Priority Description	<p>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.</p> <p>large scale multisite PDS project is set up to demonstrate the difference in production systems (beef turnoff, inputs, management and productivity) and profitability of two times of calving (March and July) of similar genetics. Most critically the comparison must occur at a similar winter grazing pressure, in that there will be approximately 30-50% more cows calving in winter per hectare.</p> <p>The two calving groups should be maintained on a designated area of land as far as possible and primary measures of productivity measured and maintained (eg: pregnancy rates, calf turnoff, weights and condition scores).</p> <p>A capable project team would design the study based around each farm participating as a replicate, with appropriate statistical power to enable rigorous analysis and peer review. A useful secondary outcome would be data to assist improved modelling of alternative cattle production systems in south west WA.</p>			
Type of Investment (1-5 stars)	R	D ***	A ****	
Assessment	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	
	Medium 2-5yrs	Regional *****	\$100-500k *****	DRD
	Long >5yrs	National ***	\$500k-\$2m	Fed
		Global	>\$2m *****	Private ***** (Harvey Beef; WA Lot Feeders Association)
WALRC Final Score	5			Rank = 10th

Priority #2020.3	Birth injury in lambs			
Background/Context	<p>The recent review of previous studies found that 54% of lamb mortalities were associated with dystocia in Australian studies conducted since 1990. Dystocia is estimated to reduce national farm profit by \$672 million per year or \$16.00 per ewe joined(L.LS.0027).</p> <p>There are major gaps 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.</p> <p>This lack of knowledge means that while risk factors can be identified, there is limited evidence to support current recommendations.</p> <p>Apart from foeto-pelvic disproportion being a risk factor for birth injury, there are a number of other possible contributing factors which require further resolution.</p>			
Priority Description	<p>Improved understanding of the causes of dystocia, and new or modified interventions to reduce dystocia and birth injury which enhance lamb and ewe survival.</p> <p>Key Outcome – Propose new or modified interventions to reduce birth injury in lambs and enhance survival of the dam and lamb.</p>			
Type of Investment (1-5 stars)	R	D	A	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs *****	Regional	\$100-500k	DRD
	Long >5yrs	National	\$500k-\$2m *****	Fed
		Global *****	>\$2m	Private
WALRC Final Score	5			RANK = 10th

Priority #2020.11	Opportunities to reduce Merino ewe mortality			
Background/Context	<p>Managing ewe mortality has economic and welfare benefits for the enterprise, and industry more widely particularly whilst rebuilding national ewe flock. Overall, there is a lack of information on ewe death rates in Australian Merino sheep flocks. The main causes of ewe mortality are also not well understood, and current management recommendations relating to ewe mortality are based on limited or outdated data that may not apply to Merino ewes in Mediterranean environments:</p> <ul style="list-style-type: none"> • The most recent review of priority diseases that cause mortality in mature sheep (Lane et al) highlighted lack of information and low confidence in the reliability of the mortality data for the majority of important fatal ewe diseases identified as having a high priority. • Most reports and modelling references the Victorian Ewe Sentinel Flock Project that monitored 18 flocks to determine mortality rate and causes of death. It is not clear whether those observations apply to Mediterranean environments, and that project didn't explore management risk factors. • Unlocking the Keys to Ewe survival is an MLA project monitoring non-Merino ewe mortalities over lambing period. Whilst this project includes 8 WA farms, it is not clear how those observations and recommendations apply to Merino ewes. • Other ongoing projects that include measuring mortality either included limited age groups or limited litter size/birth types. 			
Priority Description	Improved understanding of the important causes and quantum of Merino ewe mortality in Mediterranean environments to inform extension and adoption programs that will reduce ewe mortality.			
Type of Investment (1-5 stars)	R	D *****	A	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs *****	Regional	\$100-500k	DPIRD ***
	Long >5yrs	National *****	\$500k-\$2m *****	Fed
		Global	>\$2m	Private
WALRC Final Score	5			RANK = 10th

Priority #2020.7	Carbon Neutral Audit			
Background/Context	<p>In the rangelands - we have very differing situations in performance of grazed v un-grazed v unmanaged regions in terms of the methane emissions that are generated. For example, termites generate methane and is this accounted for?</p> <p>All we read about is how much methane ruminant animals emit, yet our farms grow 4-5000 t of dry matter/ha per year that is renewable. I want to know how much offset I get from choosing to grow 4000t of dm pasture per year."</p> <p>In the end we have to show a balance that gives us the social license in 2030 that we are carbon neutral and in fact we could be entitled to payments for offset.</p> <p>Determine the carbon footprint of stock grazing in the rangelands (and also agricultural areas) as separate mass balance investigations.</p>			
Priority Description	<p>We are failing to fully consider all the elements for a full carbon emissions audit.</p> <p>This project should prepare a detailed audit procedure to determine a fair and equitable process to inform producers of their carbon footprint. It should concentrate on standardising methodologies, identifying gaps in knowledge and coordinating appropriate research projects to satisfy unknowns</p>			
Type of Investment (1-5 stars)	R **	D ****	A **	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC
	Medium 2-5yrs *****	Regional	\$100-500k \$300K - southern rangelands; wheatbelt; and permanent pastures	DRD
	Long >5yrs	National *****	\$500k-\$2m	Fed *****
		Global	>\$2m	Private
WALRC Final Score	4			RANK = 13th

Priority #2020.17	Addressing gaps in Rhizobial ecology for N fixation in a mixed farming system			
Background/Context	There appears to be some conflicting advice about the use of rhizobium-based products for sowing with legume crops and pastures. For example, there is advice that rhizobia can be sown in the final year of the cropping phase to build up Rhizobial population for the following year. Conversely producers are advised to inoculate where there has been no legume sown in past 4 years. In addition, there are many cases of nodulation failure where all practises examined appear sound. Some of this apparent conflict may be misunderstanding and therefore an education issue. However, it is also believed that there are genuine gaps in knowledge about rhizobium ecology which if addressed would result in better performance of rhizobia and more N fixation in soils of mixed farming systems.			
Priority Description	A review of all extension advice including information materials to assess for consistency of message. Inconsistencies in message to be debated/reviewed and determined whether a knowledge gap exists and how best to address it. Appropriate research projects established to address knowledge gaps including but not limited to the concurrent application to seed dressings of pesticides.			
Type of Investment (1-5 stars)	R **	D ***	A ****	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs **	Local *****	<\$100k	AWI/GRDC *****
	Medium 2-5yrs ***	Regional *****	\$100-500k *****	DRD
	Long >5yrs	National **	\$500k-\$2m	Fed
		Global *	>\$2m	Private ***
WALRC Final Score	4			RANK = 13th

Priority #2020.2	Multispecies forage crops for better livestock production			
Background/Context	<p>Single species fodder crops involving cereals, brassicas or legumes are becoming an important component of the feedbase in Western Australian livestock systems. These crops enhance farm operation flexibility and increase animal performance providing by high quality green feed outside the “normal” growing season. However, single species fodder/forage crops can cause animal production problems such as reduced intake during the adaptation period, mineral imbalances and suboptimal growth rates.</p> <p>Early adopting producers of multispecies fodder crops observe seamless adaptation for livestock, higher growth rates and faster finishing, a longer growing season and more resilient forage production in the face of normal climate variation and soil conditions.</p>			
Priority Description	<p>Objective - Mixed species fodder crops to adapt to a changing climate, to reduce feedbase variability and to enhance farming systems.</p> <p>Field research taking existing knowledge about agronomic, physiological and nutritional value of forages to determine best bet multi species combinations to test the hypothesis that multi species fodder crops improve livestock performance. The final years of this work would naturally include PDSs to demonstrate the research outcomes.</p>			
Type of Investment (1-5 stars)	R	D ***	A *****	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	<\$100k	AWI/GRDC *****
	Medium 2-5yrs *****	Regional *****	\$100-500k *****	DRD *****
	Long >5yrs	National	\$500k-\$2m	Fed
		Global	>\$2m	Private
WALRC Final Score	3			RANK = 15th

Priority #2020.5	Making Potentially Toxic Pastures Safer			
Background/Context	<p>Many of the most productive pastures species contain toxins which affect livestock performance. Production effects are pasture species specific and range from management inconvenience, through reduced feed intake to high level mortalities. The opportunity cost of not sowing these highly productive pasture species to avoid these effects is probably the greatest cost to the sheep and cattle industries. There are a range of causative agents implicated – eg: endophyte toxins, mycotoxins, bacterial toxins, toxic plant alkaloids, mineral imbalances - and some are poorly understood or undefined.</p> <p>In general, control and outbreak response measures are limited in mitigating loss and improvements can be made. Progress in managing these issues in the last few decades has been slow and there is little ongoing coordinated research effort to overcome these problems. The exception to this has been ARGT for which a very effective biological control agent has been developed. Unfortunately it is no longer commercially available, whilst at the same time, ARGT toxic pastures are expanding into new untreated areas.</p>			
Priority Description	<p>Form a toxic pastures taskforce (working group) comprising expert scientists and economists to:</p> <ol style="list-style-type: none"> 1. Review the cause and impact of toxic pastures on grazing livestock productivity including toxic and anti-nutritional factors and mineral imbalances. 2. Prioritise and recommend a plan to address these issues based on a probability of success/industry impact/RoI model, including long term biological control. For ARGT, develop a business case for manufacture and supply of twist fungus biocontrol agent. 3. Oversee the initiation, execution and review of research work recommended by this taskforce. 			
Type of Investment (1-5 stars)	R	D	A	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local *****	<\$100k	AWI/GRDC *****
	Medium 2-5yrs	Regional *****	\$100-500k *(ARGT?)	DRD
	Long >5yrs *****	National *****	\$500k-\$2m	Fed
		Global	>\$2m	Private *****?
WALRC Final Score	3			RANK = 15th

Priority #2020.15	Nematode Worm Vaccine			
Background/Context	<p>Worms is third highest ranked production limiting disease in sheep. MLA recently released a review commissioned in 2018 by David Emery et al (B.AHE.0325). Their main conclusions were:</p> <ul style="list-style-type: none"> • Vaccines part of an IPM approach • Optimal use will vary with region • Likely role to reduce use of long acting anthelmintics • Barbers Pole vaccine now commercialised so future work should focus on scour worms. • Expensive and long term research effort • A permanent worm control tool, cf anthelmintics which have limited life • Global market, international effort, global investment \$ available • A number of new antigens identified and new technologies which could be applied. 			
Priority Description	<p>MLA initiate a taskforce comprising global scientific expertise to progress the recently completed review and establish a short list of experimental pathways to demonstrate that some vaccine candidates provide immunological protection against scour worms. Facilitate engagement of a multinational partner to further develop and commercialise.</p>			
Type of Investment (1-5 stars)	R *****	D	A	
Assessment (1-5 stars against each category)	Longevity	Impact	Size of Investment	Potential for Co-funding
	Short <2yrs	Local	\$100k*****	AWI/GRDC *****
	short *****	National	\$100-500k ***** (note scope in priority)	DRD
	Long >5yrs	National	\$500k-\$2m	Fed
		Global *****	>\$2m	Private *****
WALRC Final Score				NOT RANKED ONGOING