

WALRC Priorities for the MLA 2020-21 R&D Call

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 2020.

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 in the next MLA R&D project call that it considers would represent an appropriate response to the issue at hand.

The result of this work is a rigorously reviewed list of 18 discrete 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 June 2020, attended by the full WALRC Council.

This document is current as at June 30, 2020

How does the WALRC priority setting process work?

1. All feedback and issues collected from WALRC forums, industry forums and events and virtual forums/farm tours conducted in FY 1920, were consolidated.
2. Specific research/extension activities were developed from accumulated information, considering where work had already been done in this space. In addition, the priorities submitted 12 months ago were also reviewed for currency and removed if they were (a) already now being funded or (b) no longer relevant.
3. The WALRC Council* then considered a dossier of proposed activities for their capacity to respond to production limiting issues identified by our producer base.
4. The Council reviewed, refined, edited and finally voted on each proposed activity to arrive at an order of priority for each matter raised.
5. The amalgamation of this data provided a whole-of-group outcome which became the formal recommendation to MLA.

***The WALRC Council comprises:**

- Dr Tim Watts (Independent Chair)
- Tier 1 Members: DPIRD (Mandy Curnow), CSIRO (Hayley Norman), UWA (Phil Vercoe), Murdoch (Caroline Jacobson), MLA (Hayley Robinson)
- Tier 2 Members (Producers): John Wallace, Jessica Horstman, Lynley Anderson, Matt Camarri, Audrey Bird, Ken Shaw, Michael Humphry, Richard Metcalf
- Tier 3 Members (associates): AAAC (Alan Peggs), NRMWA (Chris Wyhoon)

Seeking More Information:

In the first instance, please direct your inquiry to the WALRC Secretariat admin@walrc.com.au

#	Title	Background and Rationale	WALRC Priority (What Producers Want)
1	Building a better feedbase for the Mediterranean zone	<p>The Mediterranean climate zone of in Australia is characterised 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. These climate challenges and large gaps in knowledge means utilisation 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. 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>	<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; and • Options to deliver ryegrass pastures that are ARGT safe and not a weed risk for cereal crops.

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2	Multispecies forage crops for better livestock production	<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.</p> <p>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>	<p>Producers are seeking mixed species fodder crops to adapt to a changing climate, to reduce feedbase variability and to enhance farming systems.</p> <p>Producers want field research that takes 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.</p> <p>It is important that the final years of this work would include Producer Demonstration Sites to help effectively extend the research outcomes.</p>
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3	Birth injury in lambs	<p>The recent review of Australian studies conducted since 1990 found that 54% of lamb mortalities were associated with dystocia. Dystocia is estimated to reduce national farm profit by \$672 million per year or \$16.00 per ewe joined (L.LS.0027). 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. 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>	<p>Producers need an 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>It is important that work in this space will propose new or modified interventions to reduce birth injury in lambs and enhance survival of the dam and lamb.</p>

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4	Reducing reproductive wastage in young bulls	<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.</p> <p>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>	<p>We propose a review of literature to identify gaps in knowledge, scope of the issue, scale of economic loss and research priorities.</p> <p>This is on the basis that investigative field research of balanoposthitis in bulls to elucidate the contribution of infectious agents and investigate potential interventions (including existing BHV vaccines) may reduce incidence and severity of balanoposthitis.</p>

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5	Making Potentially Toxic Pastures Safer	<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.</p> <p>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 is a very effective biological control agent has been developed.</p> <p>Unfortunately, it is no longer commercially available, whilst at the same time, ARGT toxic pastures are expanding into new untreated areas.</p>	<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; 3. For ARGT, develop a business case for manufacture and supply of twist fungus biocontrol agent; and 4. Oversee the initiation, execution and review of research work recommended by this taskforce.

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6	Virtual fencing – developing on-farm tactics to make it pay its way in WA	<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.</p> <p>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>	<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; and 5. Improve pasture utilisation efficiency whilst also maximising pasture growth and livestock production (post weaning lamb growth, wool production per hectare.

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7	Carbon Neutral Audit	<p>In the rangelands there are very differing situations in performance of grazed v un-grazed v unmanaged regions in terms of the methane emissions that are generated.</p> <p>For example, termites generate methane - but 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. Producers need to know how much offset they get from choosing to grow 4000t of dm pasture per year.</p> <p>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>Producers believe industry is failing to fully consider all the elements for a full carbon emissions audit.</p> <p>And, we need to determine the carbon footprint of stock grazing in the rangelands (and also agricultural areas) as separate mass balance investigations.</p> <p>We seek a project that prepares 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>
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8	Selection Indices for genetic gain in production and management traits	<p>Producers are not prepared to adopt genetic flystrike resistance breeding because of its negative correlations with production-based traits. Bare breech animals not emerging from breeding programs quickly enough and are not the sole simple solution to breeding flystrike resistant sheep. Furthermore, the use of ASBVs singly or in combination is prone to selection of animals which do not meet the studs' long-term breeding objective.</p> <p>The Merino industry has proven in the last 20 years that correlated traits CFW-BWT and FD-CFW can be improved at the same time using appropriately mathematically balanced selection indices which account for genetic correlation between traits and their heritability.</p>	<p>It seems unlikely that much progress will be made in flystrike resistance in the Merino in the absence of a fundamental and effective selection tool.</p> <p>Development, validation and publication of selection indexes incorporating a balance of production traits and flystrike indicator traits will enable positive progress towards flystrike resistance to be made by all.</p> <p>Producers are seeking indexes that support progress to low breech strike flocks without compromising productive traits.</p>

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9	The carbon footprint of our business	<p>To the majority of producers, the gross and nett carbon emissions of their livestock business is a theoretical and nefarious number.</p> <p>As we move towards an industry goal of carbon neutrality by 2030, we must improve the practical understanding of levy payers about carbon emissions</p> <p><i>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 - and links to priority #7</i></p>	<p>An adoption program in whole or part which has four main outcomes:</p> <ol 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; and 4. Creates Tools and calculators that deal with mixed farms.
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10	Subsoil constraints to more productive pastures in Western Australia	<p>The majority of topsoils in WA (all regions with duplex soils) are quite acidic (pH<5.5), and conversely many subsoils are neutral to alkaline (pH 7-9). Subsoils with higher clay content are more alkaline than those with lateritic or weathered granite geological origins. On sites where lime is applied, CaCO₃ concretions are often found in the subsoil layer.</p> <p>It seems paradoxical that liming, whilst ameliorating the topsoil, is making the subsoil layers less optimal for plant growth. High subsoils pH may also be altering the availability of micronutrients for animal production eg: Selenium, Copper and Cobalt.</p> <p>Are there better soil ameliorating techniques which makes our soils more suitable for a more diverse range of pasture species?</p>	<p>Producers are seeking a program of work to examine the impact of liming on the growth of existing and marginal pasture species, particularly root development and drought resilience - and that is regionally specific to duplex soils and South West WA pastures (Geraldton to Esperance).</p> <p>We seek research that will propose and test a range of alternative soil treatments which reduce alkalinity becoming worse at depth.</p>

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11	Opportunities to reduce Merino ewe mortality	<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. <p>Other ongoing projects that include measuring mortality either included limited age groups or limited litter size/birth types.</p>	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.

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12	Lamb Survival – What are the big hitters?	<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>	<p>A multidisciplinary effort is 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.</p> <p>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 is a key part of this..</p>

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13	Parasite resistance and scouring in sheep	<p>Regardless of mulesing, scouring sheep accumulate dag and the associated costs impact farm profitability, and has important impacts for meat and wool industry beyond the farm gate as well as impacts for sheep welfare. The causes of scouring in sheep in Mediterranean environments is not well understood. Scouring is common in flocks using best-practice parasite control, and “hypersensitivity scouring” in sheep with some immunity to worms is common and widespread. The relationship with genetic resistance to worms is complex, and selection for worm resistance will not reduce scouring. We currently have no answers to several critical issues:</p> <ul style="list-style-type: none"> • The prediction and diagnosis of scouring is difficult once sheep acquire some worm immunity • The response to anthelmintic treatment is inconsistent, and often ineffective • We have no consistently effective recommendations for prevention <p>Genetics and culling strategies contribute to long- term solutions to breech flystrike, however there are substantial gaps in knowledge about the underlying causes of scouring including (a) the hypersensitivity scouring syndrome (especially in 1-2 year old sheep), (b) role of nutrition and non-worm parasites, (c) impact of water quality, and (d) how genetic selection for worm resistance, dag and strike is best incorporated into indexes that include production traits.</p>	<p>Develop an understanding of the causes of scouring for sheep in Mediterranean and winter rainfall environments and identify opportunities to reduce scouring risk.</p> <p>Key Outcome of this work would be that researchers propose new or modified interventions to reduce scouring and flystrike risks in Mediterranean environments.</p>

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14	Are big cows (and ewes) more profitable than small ones	<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.</p> <p>If you chase all the indices - you end up with a big cow. Are we simply breeding bigger animals which eat more and have no improved efficiency, such that output per hectare is not improving? Are we making genetic progress or simply genetic change without any resulting improvement in profit?</p>	<p>Review the literature on maintenance costs for cows and correlate it with growth rates of progeny and whether the system is developing additional profits or are we simply making genetic change and cattle are getting bigger without being any more productive per hectare or more profitable?</p> <p>In the absence of literature on the subject, use the data available from Breedplan and develop a model to examine the costs of maintenance of a larger cow, relate that to growth rates and the profit or loss which may be incurred in such a system.</p>
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15	Nematode Worm Vaccine	<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 <p>A number of new antigens identified and new technologies which could be applied.</p>	<p>Producers are encouraging MLA to 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.</p> <p>Facilitate engagement of a multinational partner to further develop and commercialise.</p>

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16	Revitalising Paraboss	<p>Paraboss is currently the main extension pathway for parasite management (internal and external parasites). Paraboss is the only independent source of industry information remaining relating to treatment and control of worms, blowflies and lice in sheep. It is highly regarded by sheep producers Australia wide as a high-quality source of information for their business.</p> <p>The recently published MLA review “Strategic and Novel Approaches to Reducing Flystrike in Sheep” says: <i>“The information on the Flyboss site requires a review and revamp to bring it up to date with the latest known information. It would be useful to also re-develop the website to provide a more user-friendly structure and material. It is very important that there is a central portal for flystrike where trust information is housed and decision support tools can be found. It is therefore imperative that the Flyboss site is maintained and regularly updated.”</i></p> <p>We only add: Read Flyboss = Paraboss in the above quote.</p>	Support ongoing development of the Paraboss web-based materials and extension activities to provide updated and unbiased advice for producers and animal health advisors.
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17	Addressing gaps in Rhizobial ecology for N fixation in a mixed farming system	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.	<p>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.</p> <p>Appropriate research projects established to address knowledge gaps including but not limited to the concurrent application to seed dressings of pesticides.</p>

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18	Unlocking the potential of Pastures from Space	<p>Pastures from Space (Pfs) maintains a small dedicated subscriber base who recognise the value it provides to their grazing business. Active subscribers use it for:</p> <ol style="list-style-type: none"> 1. Monitoring and planning paddock use to match DM intake demand of lactating and growing livestock; 2. Supplementary feeding decisions; 3. Early recognition of poor seasonal growth patterns and triggering contingency plans to mitigate loss; 4. Farm purchase/leasing based on relative FOO. <p>DPIRD has done an excellent job with limited resources to keep Pfs service available and the vision alive of its role in farm decision making.</p> <p>However, Pfs has problems which producers would like to addressed. Resolution of these issues are required for further adoption and better decision making by producers.</p>	<p>This priority is about better tool development and delivery mechanisms. Therefore, we seek redevelopment of Pfs to make it:</p> <ol style="list-style-type: none"> 1. More interactive and user friendly for producers; 2. Develop training packages suitable for inclusion in business modules of MLA adoption programs, university undergraduate course units; 3. Develop interfaces to enable data transfer from Pfs to enterprise modelling; and 4. Develop a business model to transition Pfs from a free service to user pays.