



# final report

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# Increase adoption & utilization of genetic technologies implementation plan

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## **Executive Summary**

In order to increase adoption and utilization of genetic technologies in Australia, a number of isolated initiatives have been undertaken by different stakeholders. This implementation plan intends to provide a unified, across species, national approach to achieve a series of objectives:



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### 1 Background

MLA lead the development of a 5 year implementation plan to increase the adoption and utilization of genetic technologies. The process to achieve these, commenced early in 2014 with the commissioning of a "National Beef Genetics Extension Strategy" developed by Lee and Pitchford in 2014 (E.INV.1416). From the recommendations of this report a market research survey was conducted by IPSOS, to identify gaps and opportunities in the market relating to the utilization of genetic technologies (Dodds 2015). Following another of the recommendations of this report, a project was commissioned to develop a "Beef Extension Network" conducted by Monks, Upton and Conroy 2015 (BSBP 1502). Finally a Communications strategy was developed by Cox Inall to fit under this implementation plan.

In order to compile all these, plus previous reports and their findings, into an implementation plan, a process was developed that involved:

Setting up a working group that will put together the implementation plan formed by:

- Sam Gill MLA
- Alex McDonald ABRI SBTS
- Ben Hayes QAAFI
- Rob Banks AGBU
- Hamish Chandler SGA
- Don Nicol Consultant
- Jason Trompf Consultant
- Tim Emery QLD DAF
- Matias Suarez NSW DPI

Running a workshop with all major stakeholders (beef and sheep) in the delivery and extension of genetic technologies to gather their insights and feedback on the work done so far (conducted in April 2016) and involved discussions over:

- National Beef Genetics Extension Strategy
- Ipsos qualitative market research
- Beef Genetics Extension Network
- Communications Strategy

Developing a draft implementation plan based on the six main areas identified during the workshop, which are:

- National coordination & extension network
- Capacity building among key influencers
- Extension resources & tools (include proof of profit)
- Data interface and access to information
- KPIs for national genetics network (and input into Ipsos quantitative survey)
- Engaging the value chain

Running a workshop with all major stakeholders (beef and sheep) to workshop the main recommendations of the draft plan (held on the 8<sup>th</sup> September 2016). The main objectives of this workshop were:

- To build on the outcomes from the April workshop
- To review recent market research adoption of genetic technologies
- To consider and refine the Draft Implementation Plan, including developing KPI's
- Establish priorities, actions and resourcing of the Plan
- To determine next steps in the project
- Priorities from the workshop are reported in Appendix II.

### 2 **Project Objectives**

Increase the Adoption and Utilization of Genetic Technologies for Australian beef and sheep industries.

### 2.1 What does success looks like?

The success of the Adoption and Utilization Plan will be assessed at four different levels (adapted from Lee and Pitchford 2015 and Fennessy et al 2014):

- a) Increase the genetic merit of Australian livestock for economically important traits.
- b) Increase the effectiveness of use of genetic evaluation and genetic improvement tools
- c) Increase the uptake and rate of adoption (usage) of improved genetics (superior bulls/rams) at the commercial sector.
- d) Establishment of a sustainable, long-term, coordinated genetics extension network

It is essential to review with independent inputs, the current way of defining success and establish appropriate KPIs that could monitor the increase in adoption of genetic technologies as well as its benefits. The possible KPI's to assess are described in Appendix I.

A method of surveying and quantifying the KPI's will also need to be established in a consistent and long-term strategy.

### 3 Implementation Plan

### 3.1 Defining the value proposition (Proof of Profit) related activities.

#### Strategy:

Demonstrate the production and economic benefit of using the right genetics across the value chain.

#### **Objectives:**

- 1. Develop new and update existing value proposition materials into a useable format / toolkit
- 2. Identify and support a sustainable network of individuals to develop and communicate messages / material to industry
- 3. Identify key influencers within the value chain and empower them to value superior genetics

#### Outcomes:

- 1. Increase the demand for bulls/rams with high genetic merit for economically important traits
- 2. Facilitate peer to peer learnings and sharing of experiences
- 3. Apply economic rigour to good stories on genetic improvement

#### Background:

Proof of profit on the use of genetic technologies can be described as demonstrating what the value proposition of selecting bulls/rams that will sire the next generation will do to the productivity of the enterprise implementing these selection decisions.

The main objective of this strategy is to ensure that all stakeholders involved at all levels of the value chain work together and ensure that both the Sheep and Beef Industries continue to allocate efforts and resources to demonstrate the value proposition of using improved genetics. This will assist the commercial producers, which are the end users of genetic improvement, to understand the return on investment of using improved genetics creating a "demand pull" that will complement the "science push" currently focusing on the stud industry.

# Recommendation 1. A National Network of BREEDPLAN / LAMBPLAN / MERINOSELECT Advocates

One of the barriers to adoption identified by the Ipsos survey (Dodds 2015) was that commercial producers were unable to identify a local producer that was having success buying bulls/rams based on EBVs/ASBVs.

The desired outcome of this recommendation is for the BREEDPLAN/LAMBPLAN/MERINOSELECT products to be commonly known within the beef and sheep sectors and to be associated with being a "need" and not a "good to have", very relevant, simple and easy to use, that will facilitate an increase in productivity. The awareness of genetic technologies and particularly their potential benefits will be enhanced by the development of a network of commercial producers that have made gains in their enterprise using EBVs/ASBVs & Indexes and are prepared to share that knowledge (advocates). This network will interact and be supported by the Genetics Specialists (Recommendation #5) and will provide material to feed the development of case studies (Recommendation #2).

# Recommendation 2. A series of successful case studies/stories that demonstrate the value proposition on genetic improvement.

There is a clear paucity of economic studies that clearly show the profitability that can be gained by selecting high merit EBVs/ASBVs bulls/rams in commercial herds – North and South from natural and by Artificial Insemination (AI).

As recommended by Pitchford & Lee 2014 and Fennessy et al 2014, recent research outputs should be reviewed and on-farm productivity and proof of profit messages established for model farms based on differences in weaning rate, growth rate, carcass quality (and feed intake where available) that were observed for animals differing in genetic merit (teams of sires, divergent selection lines etc.). This task should be undertaken by a small team with expertise in livestock genetics, agricultural economics, livestock extension, science communication and marketing lead by the National Coordinator (Recommendation # 11).

In addition, as suggested by Monks et al 2015, another rich source of demonstration material should become available through the Beef Information Nuclei (BIN) programs being conducted by some of the major breed societies. While these progeny tests are run under controlled conditions, they are conducted on commercial properties and the sires being evaluated are a representation of current genetics, which make them relevant to any commercial operation.

#### Recommendation 3. Regional demonstration sites / benchmarking groups.

MLA's Producer demonstration sites (PDS) program aim to increase adoption of key management practices and technologies and shorten the lag between innovation and adoption.

Genetics regional demonstration sites on commercial farms and research stations will be established utilizing current resources such as government properties and commercial producers enrolled in the BINs. Each demonstration site will be coordinated by a facilitator from within the group eg a local group coordinator, stud breeder, livestock agents or similar service provider. These facilitators will be supported by the Genetics Specialists (Recommendation #5).

It is envisaged that there would be a number of activities involving the group at or near the demonstration site, many of which could be combined. Wherever possible genetics demonstration sites will be integrated with existing demonstration sites with funding support from other projects, eg genetic overlay on GRDC paired paddocks.

# Recommendation 4. Utilize feedlot and processors' feedback at the commercial producer level to enhance their selection, purchasing & breeding decisions.

In the year 2014 more than 3.2 million beef carcases have been assessed by MSA. During the same period approximately 1,200 carcase records were added to BREEDPLAN for the Angus breed. This means that the majority of carcase records are not used to derive EBVs and Indexes to assist producers to buy the right bulls/rams.

A project currently under way is intending to enable beef, sheep and pig farmers to have access to more accurate descriptions of the key attributes that influence the value of their livestock – carcase lean meat yield, eating quality and compliance to market specifications. This will be delivered through advanced measurement technologies, in synergy with abattoir automation where appropriate (Brown D. pers comm).

Enhanced feedback systems will provide producers with new information to improve decisions on breeding and compliance to market specifications. Meat processing partners will have new tools and data to improve processing efficiency and improve their capacity to allocate product to the most valuable market end-point thereby increasing the wealth of the value chain participants.

The project will capitalise on the cooperation of industry stakeholders to maximise effective decision making, reduce risk and optimise profit for all partners. Developing and improving these technologies and systems will increase competitiveness, and profitability in the meat value chain.

### 3.2 Livestock Genetics Extension Network

#### Strategy:

Develop a livestock extension network to facilitate the implementation of this 5 year plan that will enhance the effectiveness of genetic selection.

#### **Objectives:**

- 1) Increase the quantity and quality of network providers
- 2) Develop a cohesive network (including supply-chain participants) and one that is not 're-inventing the wheel'
- 3) Provide better extension approaches, tools and packages (focussing on whole farm systems)
- 4) Provide coaching for commercial producers to integrate supply-chain feedback and onfarm fit (breeding objectives)
- 5) Ensure there is a focus on defining clear breeding objectives

#### Outcome:

The main outcomes of a well-functioning livestock genetics extension network are:

- 1) A consistent message being delivered within and across livestock industries.
- 2) A common objective and broader engagement among those delivering the messages.

3) Enhanced cooperation and efficient use of finite resources.

#### Background:

There are many parties involved in beef genetics extension and education including Meat and Livestock Australia (MLA), Southern Beef Technology Services (SBTS), Tropical Beef Technology Services (TBTS), State Departments (directly [Livestock extension officers and genetics specialists] and indirectly [i.e. Local Land Services]), Agricultural Business Research Institute (ABRI), Breed Societies, Livestock Consultants, Scientists, Seedstock breeders and industry service providers including veterinarians, Scanners, Structural assessors, animal health representatives and livestock agents. In addition, Sheep Genetics Australia (SGA), Sheep CRC and others are providing extension and consultative services in the sheep industry.

A number of these efforts across northern and southern Australia as well as across species overlap and complement each other. Therefore, there is a clear need for a nationally coordinated extension network to be formalized across beef and sheep genetics extension (Monks et al 2015).

A diagram with the network and its participants in described in Figure 1.

#### **Recommendation 5. Livestock Genetic Specialists Network**

Extension efforts on genetics across beef and sheep, are run independent from each other. In addition, efforts focussed towards the stud and commercial sector are also independent from each other. DPI's, MLA, private consultants, breed societies and others have their own plans and objectives which not always complement each other.

It is necessary to create a network of Livestock Genetics Specialists to co-ordinate regional activities across species and breeds. These specialists will act as product champions, hand-holders and genetics specialists. These positions need to be distributed amongst individuals that already have skills and knowledge in the area, already have a presence with industry in their area and are considered likely to be able to establish or continue with businesses providing service to clients after the seed investment in this area has finished. It is expected that n that way the identified people could. provide the 'hand-holding' considered

It is envisaged that up to 8 additional FTEs on top of those already operating in this space such as SBTS, TBTS, Breed Societies and Sheep Genetics, will be required to undertake this task adequately. These 8 individuals will be independent and will have a greater focus on the commercial sector and they will have specific performance targets built into their KPI's and contracts



#### Fig.1. Graphical Representation of proposed network structure

#### Recommendation 6. Influential breeder support.

It is critically important for a healthy and sustainable livestock value chain that influential, top tier stud breeders are achieving the highest possible rates of genetic gain. This will ensure the foundations required to underpin the genetic improvement of all tiers of the national breeding herd/flock.

Engagement of influential breeders across breeds and species in Research and Development programs will allow for a direct contact and two way feedbacks between researchers in breeding and genetics and those breeders spearheading the genetic improvement at the stud industry. This engagement should also cover issues associated with the delivery and pipeline of information as well as the extension and communication strategies.

As recommended by Pitchford and Lee 2014, influential breeders should have:

• Direct involvement in R&D: Many influential herds are already involved in R&D. Where possible this should be maintained and/or expanded.

 Access to Influential Breeder Workshops (delivered by researchers in animal breeding and genetics): herds that are contributing the most genetic gain within a breed (factor of rate of gain and dissemination of genetics to multiplier herds) should continue to be involved in Influential Breeders Workshop to ensure that researchers get first hand feedback from those involved in the top tier of the stud industry. In addition it will allow those breeders involved, to remain up-to-date with current and future R&D programs and their outcomes.

# Recommendation 7. Seed stock sector SBTS, TBTS, Breed societies and Sheep Genetics extension initiatives

The SBTS program was created in 2005 following on the model of the TBTS program being implemented in the North six years before that. The aim of these programs was to ensure that beef cattle breeders can maximise their understanding and use of BREEDPLAN technology, thereby accelerating genetic improvement to its full potential with resultant economic benefits. In the sheep industry, Sheep Genetics provides commercially relevant information to help sheep producers more effectively select breeding animals for their particular enterprise.

In recent times, some breed societies have set up their own extension and adoption efforts (i.e. Angus Australia has committed up to 4 FTEs within their organization to work on extension and education activities), which requires a review and possible update on the structure and ways in which extension is conducted at the stud level in the beef industry.

In order to achieve the main objectives of the delivery and extension plan, it is crucial that adequate resources and clear objectives are allocated to the extension and delivery at the seedstock sector. It is essential that those delivering extension messages to the stud industry are doing so with a focus towards understanding the whole production system and the impacts of their selection decisions at the value chain.

A coordinated approach across species, towards extension and adoption at the stud level is critical. In October 2016 a review of all SBTS/TBTS performance indicators is recommended in order for the refocussed objectives to align with the objectives and KPIs of this implementation plan.

# Recommendation 8. Enhanced feedback and decision support tools for seed stock breeders and commercial producers.

Efforts are underway in both beef and sheep to develop enhanced feedback and decision support tools for seed stock breeders and commercial producers, for benchmarking (including genetic trends, selection differential) and tactical (e.g. mate allocation) and strategic decision making (breeding program design, optimizing bull buying decisions). Other benchmarking tools currently in the market, facilitate the strategic genomic testing of commercial flocks allowing producers to benchmark their flocks and improve their decision making. Benchmarking reports currently provide the basis for on-farm consultation between TBTS/SBTS and breeders and for AGBU consultation as part of influential breeder workshops (Recommendation # 6).

Easy-to-access and interpret benchmarking reports coupled with decision support tools offer significant potential for seed stock breeders and commercial producers as well as their advisors to review their breeding programs and identify changes to cost-effectively increase

rates of genetic gain. This represents an opportunity for existing extension providers, consultants as well as the genetics specialists (Recommendation # 5) to work with their clients to cost effectively increase rates of genetic gain. Similar initiatives are being delivered in beef and sheep, therefore it is suggested that further development and testing be coordinated through the National Coordinator (Recommendation #11) and AGBU, ABRI, Sheep Genetics, State Departments, Breed Societies, Sheep CRC with input/trial and testing from breeders and consultants.

# Recommendation 9. Integrate the message on the value proposition of using genetic technologies into existing and future multidisciplinary extension projects.

A stocktake and audit of existing and past extension projects need to be conducted, in order to identify strengths, weaknesses and gaps in the market. Some training programs that targeted different segments of the industry are:

- More beef from breeding
- Breeding EDGE
- BredWell FedWell
- Breedleader

Extension activities with breeders should be focusing on a holistic approach and genetics/breeding will be a central point to any of these activities. This type of training using a multi-disciplinary focus and including Genetics into these packages will reach far greater attendance than genetics conducted as a standalone activity.

It is also essential that all private consultants working in this space are given a fair go, and no unfair competition subsidised by levies, tax payers, or other sources is allowed.

#### Recommendation 10. Annual Livestock (Beef &/or Sheep) Genetics Conference

There is a clear identified need for a national genetics conference that fits within the aims of the National Livestock Genetics Consortium. It will address a gap that has existed since the end of BIA and Beef CRC and could complement / be similar to existing conferences in other countries and species (BIF – USA; Herd – Australian Dairy; Leading Breeder – Sheep Genetics Australia). Initially will be a Beef conference, with the aim to become a Livestock genetics Conference in the near future.

A national conference will help unite and provide engagement as well as direction, in order to promote a cultural change, by bringing together all stakeholders of the value chain under one roof to discuss their priorities and needs. The concept of a forum or regular workshop was suggested by many (Upton et al 2003, Monks et al 2015, Lee & Pitchford 2014). Forums have successfully been used in the past like Breedplan Expo and the genetics sections of the Beef Improvement Association conference have been important avenues for extending new genetics messages. However it has been hard to sustain interest in an annual event.

### 3.3 **Project Leadership & National Coordination.**

#### Strategy:

Program leadership and resources to ensure that the adoption outcomes are achieved

#### **Objectives:**

- 1) Provide leadership and coordination to a 5 year extension plan within the NLGC
- 2) Establish clear long term objectives for a 5 year extension plan with measurable KPIs
- 3) Develop the structure and processes required for the plan to succeed.

#### Output:

A well-coordinated network of extension providers with clear goals, working together towards achieving the main objectives of this implementation plan.

#### Outcomes:

- 1) Measured improvement in all KPIs in plan
- 2) Succession plan for industry genetic support services
  - a. experience
  - b. knowledge
- 3) Clarity of messages across and within species
- 4) Plugging R&D outcomes into extension / adoption activities
- 5) A reference group to provide two way flow of information

#### Background:

The dispersed and segmented structure of the beef industry complicates, and often impedes, the process of technology adoption (Parnell 2007). Since the completion of the Beef CRC, all extension efforts in Beef have been done in a fragmented way by Breed societies through SBTS and TBTS and state departments, consultants, MLA extension, among others. In recent times some breed societies are developing their own extension capabilities and running their own extension programs.

This creates two main problems: 1) A wide variety of programs and messages are reaching different players within the value chain in an uncoordinated way. 2) it is not possible to assess the reach and outcomes of these programs in order to ascertain the success or failure of such programs.

#### **Recommendation 11. National Coordinator/s**

A national extension network (Recommendation # 5) will require leadership and coordination in order to operate successfully and achieve its goals.

The National Coordinator will be responsible for providing:

- Leadership and coordination (30%)
- Communication and Extension (20%)
- Operations and Administration (50%)

The National Coordinator will be accompanied by three part-time project leaders to ensure that the program is stratified into 3 groups.

- o Southern Beef,
- Northern Beef and
- o Sheep

National co-ordination will bring together a broad spectrum of people interested in genetics as well as beef/sheep production to promote a greater understanding and use of genetic technologies across the entire livestock industries (Monks et al 2015). Co-ordination of genetics extension across all stakeholders of the beef and sheep industries, need to include all links of the supply chain as well as all service providers, as described in Figure 1.

### 3.4 Communications and Marketing

#### **Objective:**

To support the delivery of the NLGC's aim of increasing the adoption of beef and sheep genetics technology in Australia to increase rates of genetic gain and achieve breeding objectives.

#### **Outcome:**

- Increase awareness of the benefits of genetic breeding technologies among stud and commercial breeders and their advisors.
- Make genetic technology and how to use genetic breeding tools easily understandable.
- Raise awareness of the value proposition of livestock genetics technology throughout the value chain, from breeders through to processors.
- Encourage two-way communications between R&D stakeholders and producers so there is an ongoing knowledge exchange to help guide the direction of future R&D.

#### Background:

The conclusion of the Cooperative Research Centre for Beef Genetic Technologies (Beef CRC) in 2012 took with it, a centrally coordinated communications strategy focussing on the delivery of outcomes from the beef genetics technology R&D pipeline to industry.

Since that time, industry bodies have worked independently to encourage adoption of genetic technologies by stud and commercial beef producers. However, this approach has had several limitations, including a lack of consistent messages being delivered.

Meat & Livestock Australia (MLA) have identified the problem and called for expressions of interest in participating in a new livestock genetics consortium (NLGC), which will aim to bring together participants from all levels of the value chain and coordinate genetic research, development and adoption activities.

The aims of this NLGC include increasing adoption of genetics technology by both stud and commercial producers and improving the communication of outcomes of R&D work in the sector.

#### Recommendation 12. Implement a defined genetics communication strategy.

The approach to articulate genetic technology research will be to translate the science into real-life on-farm applications, using simple and clear language which does not overwhelm producers with data and technical language. All products need to be clear, uncomplicated and credible, with agreed key messages, timeframes and information about potential benefits and how to be involved (Cox Inall's Communication strategy).

Care will be taken not to over-hype the potential benefits of genetic technology, but rather manage expectations that these are simply additional tools in the suite which will add ongoing, incremental and cumulative productivity gains to herds and flocks. Genetic technologies are not a 'silver bullet' for livestock producers; they are part of whole-of-farm best practice management techniques which will help producers achieve their breeding objectives.

While still important in raising awareness of the livestock genetics consortium's activities, rural media circulations are declining. Therefore, in pursuing the main objectives of this implementation plan, the communications strategy places a strong emphasis on leveraging off existing channels and direct engagement with producers and service providers via social media, direct digital mail, participant newsletters and industry events and workshops.

#### **Recommendation 13. On-line discussion groups**

As proposed by Monks et al 2015, this recommendation will enable commercial producers to have a forum to discuss the practical application of genetics in context of their overall business considerations.

These groups will be formed by 5-10 people, mainly commercial producers and/or consultants with an interest in improving genetics in commercial herds, led by a genetics specialist (Recommendation #5). Their focus will be on applied genetics principles and utilizing available tools (Recommendation # 8) within the farming system and focusing on the value proposition of utilizing the right bulls/rams. The format would be predominantly digital using online conference call services.

The groups would operate according to the same key principles as a conventional discussion group; the only difference being that rather than meeting face-to-face on a member's property, some or all of the meetings will be on-line.

Conventional discussion groups can be either multi-disciplinary or special interest. The proposed on-line discussion groups would focus on the practical application of genetics on commercial farms. They could be aligned with the Northern Fertility Project or the Southern Supply Chain Project.

# Recommendation 14. Review/Update the current branding/marketing of genetic evaluations (BREEDPLAN/LAMBPLAN/MERINOSELECT).

For more than 30 years products such as BREEDPLAN have been successfully running in Australia and overseas with minimal change to its branding or marketing strategies. Branding is vital to the customer experience and the way customers perceive our products, therefore a long term successful branding strategy is required to underpin this implementation plan. Any successful business requires having a marketing strategy, and branding is a major part of it, therefore a review/update of the "genetic evaluation" brands in Australia is due. Especially in an area where science driven strategies and where value propositions of genetic improvement are hard to obtain, a strong branding strategy with the right marketing tools in place will be crucial to underpin the success of this plan.

After a comprehensive review of the results of the market research conducted by IPSOS, a marketing and branding strategy needs to be developed.

### 3.5 Building Capacity & Educational Activities

#### Strategy:

Increase the consistency of messages for all, reducing mystery and uncertainty in producers' ways to improve rate of genetic gain in the short and long term.

#### **Objective:**

Increase the capacity and effectiveness of extension and support in beef and sheep genetic improvement.

#### **Outcomes:**

- 1) Ensure that genetics specialists are properly trained in all aspects of genetic technologies and its applications at a producer level.
- 2) Develop a scholarship and mentoring program that will assist in forming the next generation of genetics specialists.
- 3) Develop train-the-trainer programs to ensure that genetics specialists are been trained on the delivery of training packages for others in the industry.

#### Background:

In order to develop a sustainable long-term plan to transform the way that extension and education is being conducted in this country, it is essential to ensure that a pipeline of competent and engaged specialists is been put in place. Academic as well as work opportunities within the industry need to be created to ensure we are not losing those early career scientists to other industries or areas of interest.

Education and training will be at the heart of this implementation plan, to ensure that that those specialists and development officers already working on this space, will continue to do so in an engaged and competent manner. In the past education has been provided over a number of years and in some cases has been very successful. In other cases, while the training has been received well and considered valuable and useful at the time, it has not lead to any real practice change. It seems that in the cases where the training has been successful it has been properly organized with the necessary follow up in order to generate changes of behaviour.

# Recommendation 15. Mentoring program for lead industry influencers in genetics and genomics.

Support, in terms of generic extension and individual advice to either breeders or commercial producers is limited at present both in numbers of personnel and their level of expertise. The former reflects the decline over the last decade in state DPI investment in specialised extension, while the latter reflects the increasing complexity of the genetic technologies and information available, coupled with the increasing sophistication of the leading breeding businesses. These businesses are growing in size and effectiveness, but are still almost all small-medium enterprise, for which employing their own technical experts is not financially viable (Banks et al 2016).

Attempts have been made to build capacity in this space over the last 10-15 years, primarily through MLA-supported short courses at UNE, and through Sheep CRC-Sheep Genetics training for service providers, and AGBU support for the Southern Beef Technology Services (SBTS) and Tropical Beef Technology Services (TBTS).

A structured, in-service training, mentoring and supervision program is needed, whereby approximately 25-30 selected personnel would receive: regular training in animal genetics and genomics principles, have regular sessions involving diagnosis of analysis outputs and how to solve data problems, ongoing training in communication and leadership in change management, as well as handling 2-3 case studies with partner leading breeders over a 12-18 month period, under tight supervision from teachers and researchers, aiming to achieve quantifiable improvements in breeders' data quality, understanding of the information and ability to communicate with sire buyers, and in the rate of genetic progress being achieved.

#### Recommendation 16. Train-the-trainer on-going programs

It is essential that a formal train the trainer program is put in place to support the implementation of this plan. A genetics specialist tool kit with the necessary resources should be developed in order to empower the genetics specialists to succeed in their jobs. These train-the-trainer programs will prepare others outside of the extension network to present information effectively, respond to participant questions and lead activities that reinforce learning. The Genetics Specialists (Recommendation #5) will need to run ongoing train the trainer programs. Additionally, there is a need for influential advisors and consultants to be kept up to date with the latest information on seedstock and commercial application of genetic technology.

Selected trusted beef and sheep industry advisors from both the public and private sector will be invited to join an extension network (Recommendation #5) which will provide a professionally delivered training, mentoring and evaluation program. The program will create awareness as well as developing the appropriate technical understanding and skill levels of advisors to effectively facilitate change in farming businesses to incorporate genetic technologies in to everyday operations (Monks et al 2015, Lee & Pitchford (2014).

#### Recommendation 17. Mentoring/International Exchange/Scholarship Program

Forming the next generation of scientists that will lead the extension and training efforts of the beef and sheep industries in the next few decades, requires a steady and long term investment. With the end of the Beef CRC and the last round of scholarships for the Sheep

CRC underway, there are limited industry funded scholarship programs left for postgraduate training in breeding and genetics. It is essential that a program is established to cover the gaps left by the completion of Beef and Sheep CRCs.

Honours, Masters, PhD, Post-doc and international exchange scholarships need to be considered to achieve the goal of training the next generation of extension specialists. As an example of the costs involved in this task: Running 3 new 3 year -\$40K scholarships a year for a period of 9 years, will incur a cost of \$280K per year. A total of 21 students will be sponsored at a cost of \$2.52M.

In addition, international exchange program will allow young scientists to visit world renowned institutions worldwide such as Roslin Institute in the UK, Waggeningen in the Netherlands, University of Guelph in Canada, Iowa State University in the US, etc... In addition, hosting students from those organisations will allow for synergies and building relationships that will benefit the Australian beef and sheep industry enormously.

# Recommendation 18. Update educational programs at different levels (Ag schools, unis, TAFE, etc) to include breeding and reproduction.

The current secondary and rural tertiary education syllabus do not contain sufficient applied knowledge on genetic technologies such as BREEDPLAN, LAMBPLAN & MERINOSELECT or genomic tools for those students to have a basic understanding when they graduate. A small working party should be commissioned to review the current syllabus content of relevant agricultural courses and suggest changes. A standard package could be developed and used at different levels of the education system.

The National Genetics Coordinator (Recommendation #11) should lead the working group in charge of updating the educational programs. Once developed this group would be responsible with monitoring the content for accuracy and currency. This activity should include secondary as well as tertiary education syllabi. As well as leading fat steers round a show ring, schools should be encouraged and supported to manage a small breeding herd/flock that is fully recorded in a genetic evaluation system. This activity should be multi-specied (Monks et al 2015).

### 3.6 VI. Updated data interface and access to information

#### **Objective:**

Independent, unbiased information on genetic technologies will be delivered to the commercial sector in a simple, streamlined and centralized interface.

#### **Outcomes:**

- 1) A commercial producer interface which allows producers to access tools, data and information that will assist them in improving the genetics of their herds.
- 2) Simplified way of reporting genetic information to end users
- 3) Decision support tools to assist the effective use of the genetic information.

#### Background:

The BREEDPLAN / LAMBPLAN/MERINOSELECT Interface can be separated between input and output, which the first one is currently majorly, if not exclusively utilized by stud breeders and the latter includes commercial producers as well.

The input interface has been designed to be used by studs, and is controlled by breed societies (beef) to reflect the needs of their membership. It requires a certain degree of technical understanding in order to understand what information and in which format is required to be utilized by the database and an effective genetic evaluation.

The output interface includes all processes and tools delivered to stud breeders, which then will be passed down to commercial producers in order to assist them in selecting which bulls to select/buy. Both of these players need to make decisions based on genetic merit of their animals, however their level of understanding of the tools and the system in general is significantly different, therefore different tools are required to tailor for the different needs of studs and commercial producers.

# Recommendation 19. Develop a breed agnostic central platform targeting commercial producers.

Currently commercial producers will obtain the information on genetics from their stud breeders, agents, vets, consultants, neighbours, rural media, etc... There is no centralized platform to target producers with case studies (Recommendation # 2) or other genetic related activities.

It is essential that a centralized commercial breeder interface (website) breed agnostic that serves as a conduit to all Sheep and Beef genetic and genomic technologies activities/information for commercial producers, including Proof of Profit (Recommendation # 2), Crossbreeding and other information.

This platform should assist in addressing the need for communicating widely about breeding tools, and others such as cross breeding, syndicate mating, etc

Currently Beef Central has developed a website that meet this criteria (follow link attached below), and establishing an agreement with them should be explored.

See: http://www.beefcentral.com/genetics/welcome-to-genetics-central-the-new-national-focus-for-the-australian-seedstock-industry/

# Recommendation 20. Develop a simplified way of reporting genetic merit information (EBVs/Genomics/Indices) targeting commercial producers.

The information supplied in sale catalogues for bull buyers, while technically correct and detailed, is generally more than the average bull buyer will be able to read and comprehend. There is a need to implement a system that evaluates a potential purchase at a glance (Monks et al 2015). It is needed to simplify the way that EBVs/Genomics/Indices are reported, especially when targeting the commercial sector.

In some countries (i.e. Brazil) they have moved away from reporting all EBVs, Accuracies in their current format (numbers, reported on the unit of the trait) to report percentile bands (deciles from 1-10) in order to gain acceptance and increase usage by commercial producers. Other countries like Ireland have implemented a Star system to display the information from

the percentile bands with great success; all other information (EBVs, Accuracies, \$Indexes) will still available for those than want to use it. See example below.

In recent times in Australia a couple of attempts were undertaken by bull breeders themselves to simplify the display of information (Nindooinbah and Raff Cattle) both implemented different ways of displaying the genetic information, using colours and bar graphs respectively.

# Recommendation 21. Develop better feedback systems and decision support tools to encourage the use of genetic information by commercial producers.

It is highly important to develop decision support tools (DSTs), which will allow producers to make more informed selection decision when selecting which bulls to purchase. These will facilitate the usage of all available information taking into account the breeding objective and needs of the buyer as well as their current situation and production system in which they produce. Such DSTs will be crucial to allow Genetics Specialists (Recommendation #5) to use on farm and educate commercial producers on how to operate them and make the best possible decisions.

There are current initiatives to develop this type of tools (apps) for finding suitable bulls (DeSireBull by NSW DPI and others) and rams (RamSelect by Sheep CRC) for commercial buyers.

Other tools should also be explored to facilitate genotyping strategies for seed stock and commercial producers (van der Werf 2016 pers comm) to optimize the benefits considering the costs and inputs required.

Other DSTs with potential to benchmarking the past buying history of the herd that could estimate the current genetic merit of the herd and plot where the purchases being considered would sit compared to this estimate. Inbreeding needs to be included in this tool development.

#### Recommendation 22. Common Language (MSA/BREEDPLAN/Sheep Genetics)

As part of the plan to promote awareness of the contribution of genetic improvement along the value chain, in order to stimulate price signals and technology "pull-through" it is important to consider unifying the language. This will simplify the process and will assist producers to utilize more effectively the current and future tools.

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Sheep Genetics Business Plan 2016

## 5 Appendix I

#### Possible KPIs to assess:

Genetic gain – based on standard industry indexes specifically developed for benchmarking-

- 1. expressed in \$\$
  - a. economic values updated every five years, and
  - b. economic values updated annually
- 2. expressed in % improvement of indexes standardised to index weights (and/or objectives)
- 3. breakdown of the top 8 major breeds (or 80% of Sheep Genetics, Breedplan)

#### Animals with genetic information:

- 1. total animals with EBVs
  - a. filtered by minimum accuracy
  - b. filtered by completeness of recording
  - c. filtered by minimum traits recorded
- 2. number of animals with genotypes

- a. Parent Verification
- b. Defect, Coat Colour, HornPoll
- c. Low, High Density
- 3. number of animals with key phenotypes
  - a. fertility
  - b. eating quality / yield

#### Within breed groups / objectives:

- Index accuracy over time
- Completeness of recording over time
- Level of inbreeding / homozygosity
- Contribution from imported vs local genetics overtime

#### **Commercial adoption:**

- Number of bulls sold each year
  - could be tracked through NLIS IDs
- Semen sold to destination (north / south and commercial / seedstock)
- Tracking of MSA index score of herds x bulls used (needs NLIS + breed society data)

#### Website utilisation:

- Completed searches
- Access to sale / semen catalogues
- Messages delivered to industry:
  - Media monitoring
  - Engagement (Facebook likes, re-tweets, etc..)

#### Commercial utilisation (de-individualised, aggregated data)

- Tracking of bulls through NLIS
- Time in commercial herds / turnaround (generation interval)

Behavioural change (determined by Ipsos Survey)

- understanding of genetic technologies by commercial breeders
- satisfaction levels of Breedplan and Sheep Genetics members
- # of breeders that have a written breeding objective.

#### Crossbreeding

- # of producers running a crossbreeding operation
- # of crossbred steers being slaughtered
- # & % of animals registered in Multi-breed evaluations

#### Capacity building pipeline:

- # of courses with significant genetics content
- # of attendants to these courses
- # of applicants to scholarships and exchange programs

Number of people engaged in network (to be reviewed and adjusted annually) Clear alignment with MISP/BISP and SISP

Sheep genetics current objectives presented in Table 1 below.

Tuble 1. Sheep Genetics industry largels with a genetic component and the equivalent genetic large	Table 1.	. Sheep Ge	enetics Industry	v targets with	a genetic	component o	and the e	quivalent	genetic	target
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Performance target	Genetic target	
Whole sheep industry	Maintain at 2% or increase the annual	Maintain at 2% or increase the annual
	rate of genetic gain across the national	rate of gain in each of the default
	flock	indexes for Terminal, Maternal and
		Merino analyses
Sheepmeat Industry Strategic Plan	Increase average liveweight gain per	Maintain or increase a genetic trend
2015-20 (SISP 2020)	day by 12.5% across the national flock	of 4% improvement across the three
	by 2020	major analyses, measured as a 4%
		improvement in PWT (post weaning
		weight) for the Terminal and
		Maternal analyses and 4%
		improvement in YWT (yearling
		weight) in the Merino analysis
	Increase marking rates by 5	Increase the rate of genetic
	percentage points by 2020	improvement in number of lambs
		weaned (NLW) by at least 0.15
		percentage points per annum in the
	Description of the second state of the sector has	Maternal analysis
	Decrease the ewe mortality rate by	Maintain genetic trends for the
	one percentage point by 2020	related traits of:
		Breech wrinkle (BWR);
		• Worm egg count (WEC);
		• Dag (DAG); and • Eat depth (EAT)
		and investigate the feasibility of a
		survival/ longevity breeding value
	Increase sheep meat eating quality by	Support the implementation and
	2 Meat Standards Australia (MSA)	adoption of the EQ index for Terminal
	consumer points by 2020	sheep breeds, with Terminal breeds
		showing a 0.04 percentage point
		improvement in intra-muscular fat
		(IMF) trends
Wool Industry National RD&E	Increase average marking rates by	Increase the rate of genetic
Strategy 2016-20	0.5% per annum	improvement in number of lambs
		weaned (NLW) by at least 0.15
		percentage points per annum in the
		Merino analysis while at least
		maintaining the average merit for
		clean fleece weight at its current level
	Increase the Merino:	Maintain genetic trends for the
	• Lamb survival rate by 0.2%;	related traits of:
	<ul> <li>Hogget survival rate by 0.13%; and</li> </ul>	<ul> <li>Breech wrinkle (BWR);</li> </ul>
	Adult survival rate by 0.1% per	<ul> <li>Worm egg count (WEC);</li> </ul>
	annum	• Dag (DAG); and
		Fat depth (FAT)     and investigate the feasibility of a
		and investigate the reasibility of a
2 The majority of performance targets have genetic a	nd non-genetic (e.g. management, nutrition) components	survivaly longevity preeding value

## 6 Appendix II

# Polling results for prioritizing strategies from implementation plan, obtained during Workshop held 8<sup>th</sup> Sept 2016

Like

	Responses		
	Percent	Count	
Must Have	69.70%	23	
Like to Have NOW	24.24%	8	
Like to Have LATER	6.06%	2	
Don't Need to Have	0.00%	0	
Totals	100%	33	

#### Strategy I. Defining the Value Proposition (Proof Profit)

Strategy III. Leadership & National Coordination

	Responses		
	Percent	Count	
Must Have	52.94%	18	
Like to Have NOW	35.29%	12	
Like to Have LATER	11.76%	4	
Don't Need to Have	0.00%	0	
Totals	100%	34	

#### Strategy V. Building Capacity & Educational Activities

	Responses		
	Percent	Count	
Must Have	46.88%	15	
Like to Have NOW	28.13%	9	
Like to Have LATER	25.00%	8	
Don't Need to Have	0.00%	0	
Totals	100%	32	

#### Strategy II. Livestock Genetics Extension Network

	Responses			
	Percent	Count		
Must Have	48.48%	16		
Like to Have NOW	42.42%	14		
Like to Have LATER	9.09%	3		
Don't Need to Have	0.00%	0		
Totals	100%	33		

Strategy IV. Communications & Marketing

	Responses		
	Percent	Count	
Must Have	41.18%	14	
Like to Have NOW	41.18%	14	
Like to Have LATER	17.65%	6	
Don't Need to Have	0.00%	0	
Totals	100%	34	

Strategy VI. Updated Data Interface

	Responses		
	Percent	Count	
Must Have	39.39%	13	
Like to Have NOW	30.30%	10	
Like to Have LATER	30.30%	10	
Don't Need to Have	0.00%	0	
Totals	100%	33	