MEAT & LIVESTOCK AUSTRALIA

National Livestock Genetics Consortium

to 2020 and beyond

Contents

Overview/Executive Summary 2

NLGC Plan on a Page ..... **Error! Bookmark not defined.**

Situation analysis 3

NLGC SWOT Analysis 5

Strategic Imperatives 6

Strategic Investment Areas 7

Investment Matrix 8

Governance 9

- Project Assessment 10

Critical success factors 10

Objectives 11

- Industry objectives 11
- Operational objectives 11

Adoption 12

Key Performance Indicators 13

Budget 14

Overview/Executive Summary

There is an opportunity to increase the rate of genetic gain across all sectors of the red meat industry and to align genetic investment to value chain outcomes in order to improve commercial profitability. A value chain approach will ensure genetic outcomes are closely aligned with meeting consumer needs and thus becoming outcome focussed. Through an outcome focussed approach, the investment in genetics will lead to addressing key drivers of profit including, but not limited to – improving market specification compliance, reducing costs, increasing growth rates, improving fertility and improving livestock production efficiency to improve overall productivity.

The current models for the commercialisation of genetic outputs through BREEDPLAN, breed societies, LAMBPLAN, MERINOSELECT have led to the current levels of genetic gain and the advancement of our beef and sheepmeat industries. There is now an opportunity to take genetic gains to the next level and lead the world by coming together as an industry to attract unprecedented co-investment that will deliver ground breaking opportunities for the red meat industry.

The National Livestock Genetics Consortium (NLGC) was initiated to be the vehicle that drives collaboration, transparency, communication and investment in livestock genetics research, development, extension and adoption (RDE&A) in Australia. The primary aim of this initiative is to significantly increase the rate of genetic progress achieved for traits that drive value chain productivity in the sheep and beef industries. The NLGC will function as a collaborative co-investment vehicle for new investments in genetics and genomic RDE&A that will utilise MLA and MLA Donor Company (MDC) governance structures to engage and oversee projects.

The NLGC is a stakeholder driven process that will create a clear commercial value proposition to reduce the costs of genetic investment, engage the value chain and invest in research and development that will lead to the greatest rate of adoption. Improving adoption will in turn improve the profitability of the industry by better meeting the needs of consumers and participants the length of the value chain.

Through consultation with key industry stakeholders, the following outcomes have been developed that will be delivered by the NLGC::

- To double the annual rate of improvement in industry genetic value by 2022.
- To coordinate research, reduce timelines and costs ensuring delivery of world leading genetic improvement.
- The seamless transfer of information to industry and provision of easy-to-use data sharing products and services – one national data base accessible by all industry participants.
- Improve adoption through unifying the delivery of genetic RDE&A across the livestock industry.

Through:

- World leading R&D
- Cultural Change
- Disruptive Technologies
- Accessible data platform
- Disruptive Partners/Collaboration

NLGC Plan on a Page

IMPACT	**By 2022, >$400 million industry improvements through doubling the rate of annual genetic gain in the commercial livestock industry value chain.**			
OUTCOMES	• **To double the annual rate of improvement in industry genetic value by 2022.** • **To coordinate research, reduce timelines and costs ensuring delivery of world leading genetic improvement.** • **The seamless transfer of information to industry and provision of easy-to-use data sharing products and services – one national data base accessible by all industry participants.** • **Disruptive Technologies, cultural Change, open data platform, world leading R&D**			
STRATEGIC INVESTMENT AREAS	**BASIC R&D** • Cheaper genomic tests; • Gene editing & cloning • Novel phenotypes • New SNP tests • Sequencing variants	**APPLIED R&D** • Multi breed evaluation • Repronomics • Proof of profit • Improved phenotype collection • Next gen evaluation • Research datasets • Single step genomics	**DEVELOPMENT & INFRASTRUCTURE** • Open data platform • Reference populations • Multiplier herds • Multibreed herds • Next generation information management • International datasets • Genotype datasets	**ADOPTION, COMMS & TRAINING** • Genomic decision tools • Next generation information • Extension network • Interface access to breed values • Genetic evaluation software • Cheaper genomic tests • Decision support tools
PRIORIY RD&A INVESTMENTS	**REPRODUCTION& WELFARE** Reproduction outcomes in; (R1) Tropical beef (R2) Temperate beef (R3) Sheep	**PRODUCTIVITY** Productivity gains in; (P1) Tropical beef (P2) Temperate beef (P3) Sheep	**CARCASE QUALITY – EATING, YIELD & OTHER** Carcase & eating quality traits in; (Q1) Tropical beef (Q2) Temperate beef (Q3) Sheep	**ADOPTION & EVALUATION** Clear pathway to implementation; (I1) Adoption (I2) Evaluation (L3) Barriers (issues identified)
ENABLING PLATFORM INVESTMENTS	Projects that enable improvements to genetic progress via; (E1) Data platform (E2) Improved Tests (E3) Populations/ resource (E4) Software, analytics & tech.	+	Projects that influence rate of genetic gain through; (D1) Management and strategy (D2) Development of existing programs (D3) Collaboration with partners	

Situation analysis

Environmental

- Increasing the rate of genetic gain will drive productivity gains to reduce environmental impacts of livestock production

Technical

- 'Single Step' analyses are ready in the sheep industry and very close in the beef industry
- New genomic tests are emerging
- Greater understanding of gene editing and cloning technology
- Single platforms in the sheep industry
- Separate databases in the beef industry
- Low value proposition for the commercial sector

Social

- Animal Welfare – e.g. poll gene
- Consumer views on gene editing/cloning are not known
- Aging population (scientists and producers)
- Capability levels of stakeholders across the value chain
- Collaboration opportunities to utilise the best minds in the business in Australia and overseas.

Political

- Leveraging government funding to increase the rate of gain aligns with Productivity and Profitability – Pillar 4 of MLA 2020 and MISP
- Regulation of cloning and gene editing work occurring with the Office of Gene Technology Regulator (OGTR)
- Trade regulations of importing countries need to be continually reviewed

Economic

- Reducing costs of production will have a huge impact on producer profitability
- Consumers are prepared to pay more if satisfied. Genetic investment needs to align to meeting consumer expectations in order for Australia to remain competitive.
- Current cost of measurement and genomic tests are cost prohibitive and reducing uptake
- There is a need to redefine the commercial value proposition to increase use of genetic information

Legal

- Several patents in the genomic space pose a threat to future investment
- Protection of IP of current and future work needs to be resolved to create opportunities to pool data for greater access, accuracy and adoption

NLGC SWOT Analysis

Strengths

- Capability to tackle significant challenges that require collaboration with stakeholders across the value chain
- Foster collaboration to deliver efficiencies and cost savings through minimising duplication of resources, administration and operations.
- Ability to draw upon research in one area to contribute to research in another area avoiding duplication and ensuring the best minds are engaged.
- Ability to identify and address the drivers for the commercial adoption of genetic improvement technologies. Thus articulating the impact of genetic improvement on the profitability of commercial enterprises.
- Transcends current funding restrictions by bringing together strong teams that create compelling investment opportunities.
- Reduces the risk associated with R&D investments by aligning to the NLGC strategic areas, partnering with like mined organisation and ensuring there are clear pathways to adoption.

Weaknesses

- Potential to become 'Top Heavy' over time (increases transaction costs, loss of agility)
- Researcher reliance on third party funding, inability to generate own independent income. Liquidity could become an issue for some research institutions without longer term funding arrangements.
- Risk of the NLGC taskforce not performing to expectations within the decision making and governance of the NLGC.
- Potential for the panellists of the NLGC to represent their sector for an extended period of time. Fresh and current views and understanding of the industry will underpin NLGC success.
- Protectionism of the current models of operation could limit the development of more cost effective business models that will drive greater commercial uptake

Opportunities

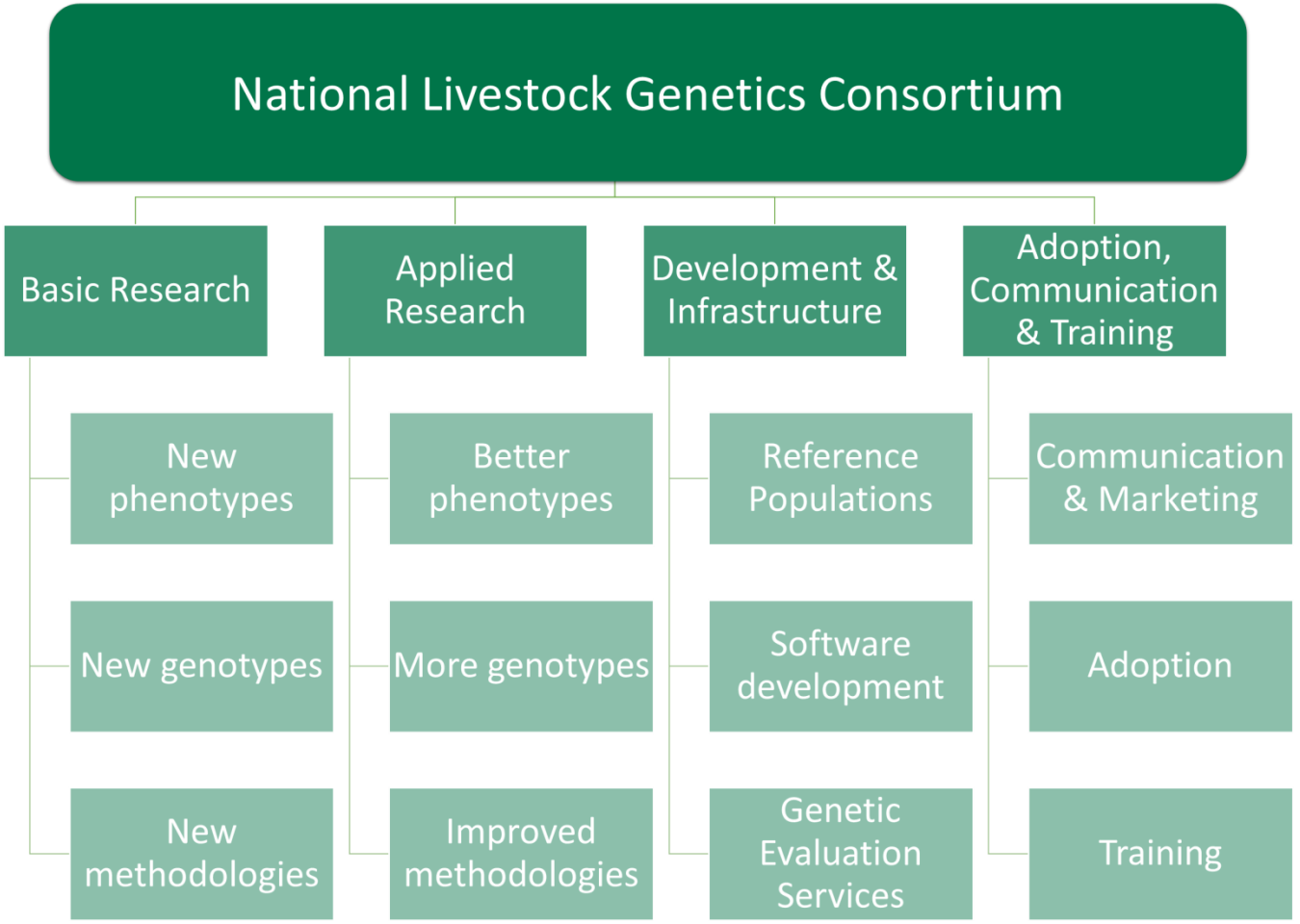
- Lower cost of new technologies, tools and resources is progressing rapidly. Allowing quick and easy implementation of low risk genetic solutions to generate early success and improve the bottom line.
- Opportunity for sharing, creating and compounding the return on investment in genetic technologies throughout the value chain.
- Platform to leverage funding opportunities and address issues of greater capacity of the individual stake holder.
- International collaboration, funding and competition. Advancing Australian genetic solutions and tools to the global stage.
- Showcase the value of genetic improvement across the whole value chain.
- Generate collaboration of databases to stimulate research, innovation and adoption to build a trusted genetic information pipeline.
- Work with Sheep CRC to ensure that it has a legacy and successor when it terminates in 2019.
- Opportunity to value the recording of phenotypic measurements across both beef and sheep as genetic evaluations shift towards 'Single Step' analyses

Threats

- Industry integrity may be compromised if the NLGC does not achieve the NLGC mission.
- Purpose of the NLGC may be compromised by the lack of intent to truly collaborate. Individuals leveraging off the consortium for their own agenda. Or if the NLGC is perceived to be favouring some stakeholders more than others.
- Lack of skilled people to continue the NLGC into the future and support adoption plans.
- Inconsistency or inability to define RDE&A projects that must go through the consortium pipeline.
- Capacity to deliver in a timely manner. Focus on getting RDE&A out in a timely manner.
- Failure to demonstrate/articulate clearly the value of participation from stakeholders across the value chain. Including external investment in RDE&A.
- To become more focused on research and neglect the value of development and adoption.
- Perceived control that the NLGC would have over the projects proposed.

Strategic Imperatives

Strategic Investment Areas



Investment Matrix	Basic Research	Applied Research	Development & Infrastructure	Adoption, Communication & Training
Disruptive Technology	• New/Novel Phenotypes • New SNP Tests • Sequencing Variants • Novel Evaluation Tools • Automated data capture for real time analyses • Human genomic data analysis	• Improved phenotype Collection • Multibreed analysis & indices • Cheaper SNP tests • Repronomics • Commercial production predictors	• Accessible Data Platform • Multiplier Herds • Research populations • Breeder validation projects • Multibreed herds	• MSA into Beef and Sheep genetic evaluations • Genomic decision tools • Cheap genomic tests • Genetic evaluation software & delivery • Decision support tools
Culture Change	• Genomic Decision Tools • Valuing phenotypic recording	• Proof of Profit • Commercial value Proposition • User centric design • Participatory R&D	• Genetic Decision Services • Next generation information management	• Capability building • Extension network • Commercial & seedstock • Adoption communications
National Data Platform	• Sequence datasets • Bos indicus genome	• Research accessible data platform • Next Gen Genetic Evaluation	• International data exchange • Commercial datasets • Seedstock datasets • Genotype datasets	• Delivery of genetic evaluation • Aggregation services • API development • Interoperability standards • Interface access to BV's
World Leading R&D	• Gene Editing • Cloning	• Single Step Analysis • Difficult to measure data	• Beef Information Nucleus • Sheep Resource Flock	• Next Generation Information
Disruptive Partners/Collaboration	• Engagement with genotyping companies • Across Species R&D • Human genomic data analysis	• Across Species R&D • Genotyping companies • Multibreed analysis & indices	• Other data sources • Reference Populations • Next generation information management	• Adoption communications • Extension network •

Governance

The NLGC will be governed by a skills based Taskforce established and funded by Meat & Livestock Australia (MLA). The role of the NLGC Taskforce is to provide a formal industry consultation platform for the investment in livestock genetics led by genetic researchers and key industry stakeholders. The NLGC Taskforce will act in an advisory capacity and make recommendations, seek out and refer interested third parties and monitor the investment into genetics and genomics RDE&A. The Taskforce acts in an advisory capacity in accordance with the taskforce terms of reference (TOR) which is included as Appendix I.

The formation of the NLGC Taskforce enables the commencement of the NLGC.

The NLGC Taskforce representation is balanced across the following sectors:

- Northern Beef
- Southern Beef
- Breed Societies (x2)
- Researchers (x2)
- Merino producer
- Prime lamb producer
- Integrated supply chain
- Processor
- Composite breeder
- Adoption & Extension

Recommendations from the Taskforce will be considered by the MLA Board and Peak Industry Councils in making decisions on major investments into genetics and genomics RDE&A that address the goals of the NLGC. When formulating advice, the Taskforce will seek a consensus position across industry representatives.

The Taskforce will particularly focus on;

- Analysing and providing recommendations on the genetics RDE&A landscape including gaps, priorities and opportunities;
- Identifying opportunities to facilitate collaboration across organisations to address industry priorities;
- Undertaking calls for and/or assessment of concept notes and proposals;
- Undertaking evaluation and monitoring of projects or programs; and
- Where appropriate, linking into MLA consultation processes, including the expert panel and red meat panel process for final project selection.

The role of the Taskforce will be to:

- Ensure the objectives of the NLGC are achieved
- Ensure effective management and stakeholder consultation and communication
- Ensure governance processes are maintained
- Ensure the objectives in line with the MISP 2020 are on track
- Lead the process in prioritising the areas of investment
- Be structured on a program/sub-program basis, over a 5 and 10 year timeframe;
- Outline available funding currently known and seek new investment (cash and in-kind);
- Ensure evaluation and reporting arrangements that will provide accountability and transparency to investors but allow for flexibility to capture new opportunities.

Project Assessment

Projects will be asked to address terms of reference that reflect investment in the key priorities areas of the NLGC investment matrix.
Project applicants are required to submit project application using the MLA full project application forms for MLA or MDC applications.
A project call will go out on an as needs basis but at a minimum of twice per year
The NLGC taskforce are charged with undertaking an expert review of the proposals and will make recommendations to the MLA and MDC boards for projects to be funded.

Critical success factors

For the NLGC to deliver against its strategic principles, the Consortium must:

- Generate and attract funding while delivering efficiency gains in the administration and delivery of genetics RDE&A programs.
- Have a mandate to operate throughout the value chain and be able to interact and enable two-way communication and knowledge sharing with all stakeholders, including other industry established regional and national entities.
- Ensure transparent processes for planning, decision making, feedback, consultation, monitoring and reporting.
- Develop clear, commercially motivated, value propositions for the adoption of genetic technologies and genetic gain for each participant in the value chain.
- Implement mechanisms to identify new funding opportunities, draw appropriate teams together and develop clearly defined compelling proposals for funding.
- Understand the international context and have mechanisms to attract international awareness of the Consortium and interest in working with the Consortium.
- Develop a long term plan for genetic technologies which transcends the immediate priorities of the individual stakeholders and ensures collaborative and consultative investment which benefits the whole industry.
- Develop compelling incentives and the culture for collaboration and provide a vehicle to develop large and complex ideas and solutions.

Objectives

The objectives, tactics and outcomes are established to define the criteria against which RDE&A activities would be assessed in order to ensure they contribute to the higher level vision, mission and goals the NLGC. The objectives are summarised below, including the link between objectives, tactics and outcomes. The objectives are also aligned to the broader industry strategic plans, specifically the MISP, BISP and SISP.

The primary objective of the NLGC is;
"By 2022, > $400 million Industry improvements through doubling the rate of annual genetic gain in the commercial livestock industry value chain"

Industry objectives

- Understand the value and profit drivers across the value chain and develop and promote mechanisms that increase the incentives for improved genetics and increase the information available to drive genetic improvement.
- Develop technologies that maintain Australia's position as a world leader in genetic improvement science and application and which underpin genetic improvement across the value chain. *NOTE "Technologies" includes the ability to record and improve new and existing traits contributing to industry value.*
- Develop tools that are easy and cost-effective to use that enable more widespread and more effective genetic improvement that is utilised by a greater proportion of the full livestock value chain.
- Ensure that Australia is engaged in and/or has access to strategic basic research that will, in the longer-term, generate new ideas for future applications.
- Ensure there is ongoing capacity and capability in Australia to deliver RDE&A activities.
- Sustain and expand genetic resources (such as reference populations) to underpin future research and development, including the capture of data from commercial and research populations.
- Improve access to, acquisition of and sharing of industry and research data across the value chain.
- Address barriers to adoption of genetic improvement technologies.
- Ensure that communication, training, extension and marketing activities are sufficient and appropriate to support increased demand for animals with higher genetic merit, improved uptake of genetic technologies and tools and increased rates of genetic improvement. Ensure that genetic innovations are delivered to industry in a timely, coordinated and cost effective manner.

Operational objectives

- Identify major challenges in livestock genetic RDE&A and attract ongoing investment of sufficient scale to address these challenges.
- Ensure the cost effectiveness and relevance of RDE&A activities across the supply chain.
- Enable greater co-ordination of investment and collaboration in activities.
- Improved stakeholder understanding of what is being done in genetics and genomics RDE&A and why.

Adoption

A major component of the NLGC mission is to increase the adoption of genetic research and development along the whole value chain. A clearly defined adoption strategy is needed to ensure that Research and Development resonates through industry in a collaborative and timely manner. Surveys have found that there has been a lack of genetic uptake in both the beef and sheep industries, industry targets will only be met if genetic extension messages are effectively delivered and adopted.
Five key priority activities defined by the NLGC for investment to increase adoption include:

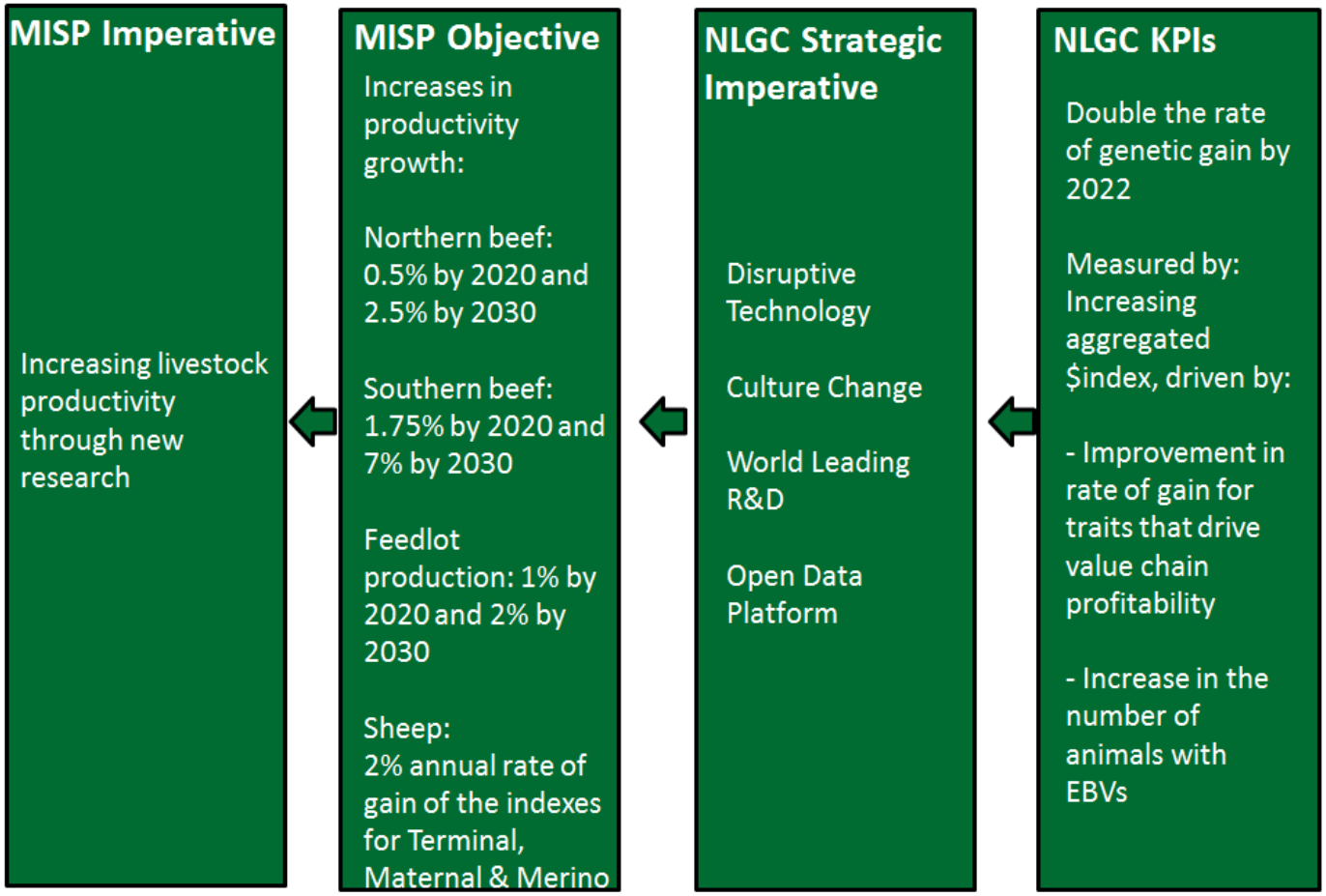
1. Develop a nationally coordinated livestock extension and adoption service that increases the effectiveness of use and demand by the commercial producer
2. Provide a two tier extension service that incorporates greater involvement in the private sector
3. Enhance the engagement with seedstock breeders through current and improved adoption programs – focus in northern Australian beef where genetic service uptake is low.
4. Establish a project that ensures stud and commercial breeders have a much better understanding of the value proposition for investment in objective measurement
5. Develop and customise a simple, uniform language to be used in all reporting, tools and extension programs

The adoption plan makes a number of strategic recommendations targeting a uniform collaborative approach to extension activities. The NLGC will support and utilise these recommendations to ensure the adoption outcomes are achieved. A number of development officers in SBTS/TBTS/Breed Societies/SG are already engaging in successful adoption strategies in the seedstock sector. The NLGC aims to support the current adoption pathways and extension activities, whilst increasing the focus on adoption programs in the commercial sector.
The main recommendations in the adoption implementation plan that the NLGC can directly implement include:

1. Livestock Genetic Specialists Network
2. Integrate the message on the value proposition of using genetic technologies into existing and future multidisciplinary extension projects.
3. Annual Genetics Conference
4. National Coordinator
5. Monitor and evaluate performance against project KPI's and objectives
6. Implement a defined genetics communication strategy. – digital strategy collaboration
7. Develop a breed agnostic central platform targeting commercial producers.
8. Develop a simplified way of reporting genetic merit information (EBVs/Genomics/Indices) targeting commercial producers.
9. Develop better feedback systems and decision support tools to encourage the use of genetic information.

The adoption implementation plan is included as Appendix II and will be reviewed as a standing item on the NLGC Taskforce agenda.

Key Performance Indicators



*The NLGC detailed KPI's will be developed with the NLGC Taskforce which will then be used as the basis to the evaluation plan that will be developed and form appendix IV

** The Sheep Genetics Business Plan is included as Appendix III

Budget

NLGC Budget – investment summary

Project Type	Northern Beef		Southern Beef		Sheep	Total
	Funded	Approved Dec & May	Funded	Approved Dec & May	Total	
Basic R&D		2,234,396			4,959,600	**7,193,996**
Applied R&D	2,084,617	14,085,550	2,526,487		6,482,381	**25,179,035**
Development & Infrastructure	2,868,051	2,450,000	15,836,919	2,450,000	4,607,646	**28,212,616**
Adoption & Commercialisation	2,170,742	395,465	2,528,739	4,362,644	6,572,449	**16,030,039**
Total	**7,123,410**	**19,165,411**	**20,892,145**	**6,812,644**	**22,622,076**	**76,615,686**