final report

Project code: B.SBP.1502

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Date published: 14 June 2016

PUBLISHED BY
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Beef Genetics extension network - Phase one: National coordinator

Meat & Livestock Australia acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

Abstract

This project builds upon a significant body of existing work on beef genetics extension and training (Lee and Pitchford 2014, ABRI 2015, McCosker et al. 2010, Freer et al. 2003 and Upton et al. 2005 & 2008). A key difference between this report and previous work is the focus on broadening the impact of beef genetics extension into commercial herds and it is recommended that this should be the focus of phase II of this project. This can be achieved by including in the network those groups who already have a trusted relationship with commercial producers (i.e. those in the 'production zone' of the influence map developed in this report). Genetics messages will need to be re-developed and packaged in the context of practical farming systems. Ideally, these should be integrated within two 'super', multidisciplinary projects – Northern Fertility Project and Southern Supply Chain Project'. Six delivery vehicles are proposed for the beef genetic network's priority activities.

Executive summary

A beef genetics extension network currently exists but its main activity is focussed around seedstock herds, breed societies and the genetic experts who make up the 'knowledge zone', represented in the pink area on the influence map (over page). However, the sheer volume of cows resides with commercial[1] producers, so if the industry is to benefit from genetic improvement any extension network must include the commercial producers and the people who influence them.

Our vision is for an expanded beef genetics extension network whose reach extends beyond seedstock herds to include commercial producers in both south and north Australia – and those who influence them (ie the green 'production zone' on the network map). We refer to this as an 'industry wide beef genetics extension network'.

To be effective the industry-wide beef genetics extension network must focus on the practical application of genetics within the overall farming system and business. We recommend that main genetics extension be delivered through multidisciplinary 'super' projects; for example, we propose:

- The Fertility Project for Northern Australia (refer appendix 3)
- The Supply Chain Project for Southern Australia (refer appendix 4).

Dodd et al. (2015) has described and illustrated the very different mindsets of stud farmers and the people who operate in the genetics knowledge zone (the green head on the influence map) in comparison with those who operate in the production zone (the brown head on the network map). Network activities and genetics extension efforts must be designed to address these different mindsets.

Engaging commercial producers and those in the production zone will enhance the existing network that is focussed on seedstock herds. Commercial producers who become more 'genetics savvy' will create 'pull through demand' for better bulls from their seedstock suppliers. The importance of this pull through demand was strongly expressed by stakeholders participating in the 'Ekka workshop' held on 5 August 2015.

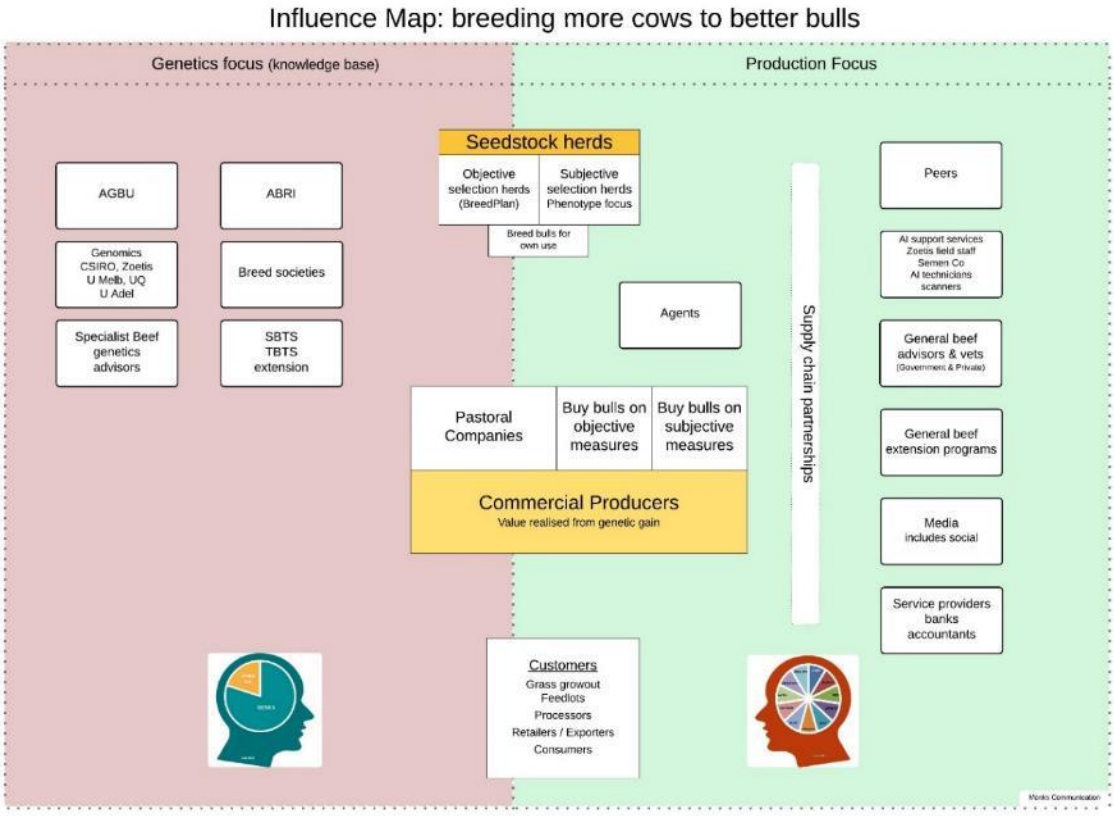
It is relatively straightforward to establish and co-ordinate a network; however fundamental changes are required for an industry-wide network to successfully facilitate genetic gain in commercial herds.

- A cultural shift by those in the 'genetic knowledge zone' to recognise that:
    - The breeding objective for seedstock herds must be aligned with the requirements of the commercial industry: they are the operators who apply the improved genetics;
    - Commercial herds will only value genetics as part of a mix of whole farm/business issues.
    - People/groups in the genetics knowledge zone have little influence on commercial producers; genetics messages will have greater influence if delivered via people in the production zone.
- Convincing the people in the production zone who currently influence commercial producers that genetics is relevant to their clients' businesses and their own. And subsequently supporting them to gain more skills in the practical application of genetics.

[1] Commercial producers are defined as those operating at a commercial scale of beef production as opposed to hobby farmers.

- Raising the credibility of those in the genetics knowledge zone with commercial producers in northern Australia (credibility will be earned by providing commercial producers with relevant, useful information and tools for using beef genetics).
- Re-developing genetics messages and extension tools to be relevant to commercial producers and their advisors; i.e. the practical application of genetics within the whole farming system and business in a language that is easily understood in the limited time allocated to genetics as part of the business.

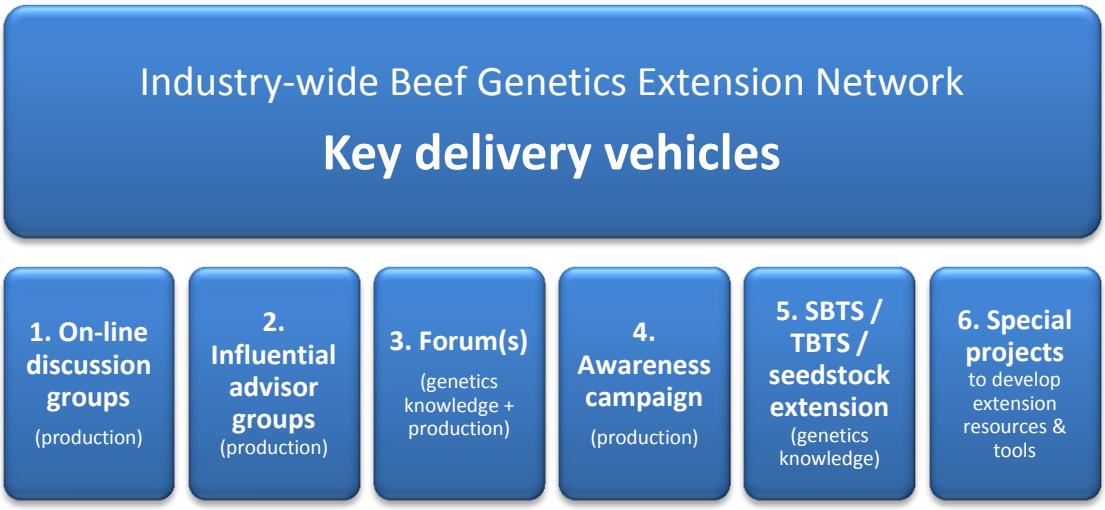
Our recommendations fall within two categories: establishing an industry-wide beef genetics network and developing the resources and tools to deliver beef genetics messages in a format relevant to commercial producers. The latter will require significant additional investment by MLA.



If the improved coordinated beef genetics network is established it will significantly add value to the industry by encouraging faster rate of gain in the seedstock sector, resulting in better bulls being available to the commercial bull buyer and increasing the number of commercial cows mated to superior bulls by encouraging those in the production zone to use genetic information to seek improved bulls. In addition to the increased industry profit other values will accrue including a reduction in carbon emissions.

Delivery vehicles

If well-coordinated, a combination of six key activities should be able to deliver the recommendations detailed later in the report.



Contents

1. Background and methodology

This project builds upon a significant body of existing work on beef genetics extension and training (Lee & Pitchford 2014, ABRI 2015, McCosker et al. Holmes 2010, Fennessy et al. 2014, Freer et al. 2003 and Upton et al. 2005 & 2008). A key difference between this project and previous work is the focus of this report on broadening the impact of beef genetics extension into commercial herds.

In investigating the potential activities and implementation of a co-ordinated beef genetics extension network, the project team has:

- Consulted with beef genetics experts, commercial and seedstock breeders, particularly in the northern industry.
- Estimated the potential value to industry from a successful network.
- Developed an illustrative 'map' of the key influencers in beef genetics.
- Identified cultural changes required to expand the impact of the network to commercial producers.
- Developed concepts for potential delivery vehicles for beef genetics extension.
- Outlined priorities for the network's first year of activities.

People representing a wide spectrum of beef industry stakeholders (see Appendix 1), were consulted individually (face-to-face and phone) or in a facilitated focus group at the special purpose Brisbane EKKA workshop. The MLA genetics consortium was given a presentation and invited to contribute. An interactive, iterative approach was taken, with consultees given the opportunity to respond to the summary of our stakeholder feedback and draft recommendations. The project team then synthesized responses into the main messages for this report.
The project team has also reviewed the relevant literature and many of the suggestions in the report reflect recommendations from reports related to the topic.

2. Project findings

2.1 Value of a coordinated network through its influence on genetic gain

Banks (2015) concluded that in the absence of coordination, the overall performance of genetics within the industry will fall short of what is possible.

Milestone 2 submitted by this project took a rational perspective and calculated that small increases in profit on a per animal basis from genetic gains accumulate over time contribute to large profit increases on an industry scale. Value was achieved by genetics increasing the profit potential of sires available to the industry and increasing the number of cows mated to improved sires. It was assumed that the advent of a coordinated beef genetics extension network would be able to affect an increase in the rate of genetic gain but no change to the number of cows mated to improved bulls. Using this assumption the team calculated that if the rate of genetic gain in the north was doubled and in the south increased by 25% then the resulting increase in profit over a 15 year period would be $112m in the north and $330m in the south. This concept was described to the stakeholder workshop in Brisbane and their suggestion (mean of all answers) was that a network could increase the rate of genetic improvement by 33% but would also increase the number of cows mated to improved bulls by 43%. Using these numbers the increase in profit for the northern industry is $56m.

The team estimated an increase of 100% in the rate of genetic improvement for northern seedstock herds based on the effect that new genetic predictors for fertility would allow a substantial increase in the rate of gain. In the last year the change in genetic merit for Brahman bulls has exceeded 100%, increasing the confidence that an improved extension network would substantially increase the rate of genetic gain.

Suarez (pers comm) analysed prices paid at auction in spring 2015 compared to the recorded genetic merit of sale bulls plus their weight on the day and order of sale. By far the highest relationship to price paid was weight on the day which indicates that the buyers are not using genetic information provided to value bulls. There were large differences between seedstock herds with those herds that feature genetic information in promotion of their sale bulls having a greater relationship between index and price paid. Similar results were reported by Van Eenennaam et al. (2012). But if the stud is making genetic progress the clients will also be making progress so it isn't essential for buying decisions to be related to genetic merit within a sale catalogue. Extension of genetic information to the production sector will add value via two pathways: firstly it will enable bull buyers to value purchases using published genetic information and secondly to encourage buyers to purchase from seedstock herds publishing genetic information. Also these herds tend to be making genetic progress and have a high average genetic merit in their sale bulls. Mobility of ram purchasers between competing studs is thought to be possible and of benefit to genetic progress within the sheep industry (Atkins et al. 1993). The same must be true of the beef industry.

The original assumptions were based on improvement of the extension network but still concentrating on the seedstock sector. Stakeholder consultations have convinced the team that most change is required to the network that services the production zone of the beef industry. An improvement in this sector will increase the number of cows mated to improved bulls. Without an introduction of the proposed coordinated network it is unlikely that many changes to the adoption of genetics in the commercial sector will occur and therefore the increase in the number of cows mated to superior bulls will not increase at a rapid rate.

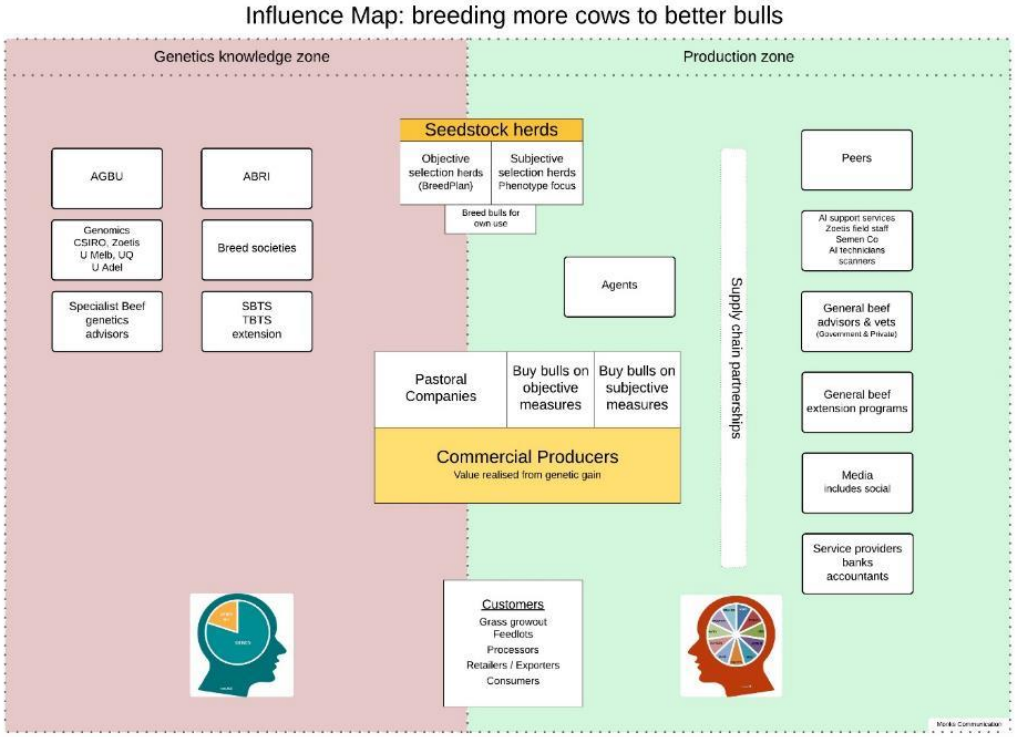
Genetics as the invisible force in beef production requires marketing to those who can benefit. The proposed coordinated network activity is a multi-pronged approach to making genetics part of the language for the production sector of the industry.

On a broader basis the value proposition should consider values that may not be measured in profit or are hard to assign a monetary value. Soundness traits have a genetic component and breeders will include these among their breeding objective. It is generally accepted that there is an association between soundness and longevity but the evidence tends to be anecdotal.

Genetics can be used to increase productivity, fertility and weight for age of slaughter animals, and these factors will significantly reduce carbon emission per kg of beef produced. But a more direct selection against carbon emissions is suggested by Hayes et al. (2015). A project relating genetic improvement to reduce carbon emissions would be timely and add significant value to the extension efforts and may open significant funding opportunities.

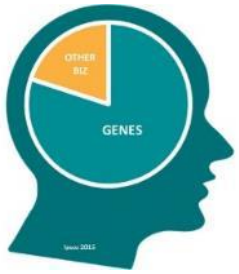
2.1.1 Genetics needs to extend its influence beyond the knowledge zone

The project team has formulated a network map with two overlapping zones. The first named the ‘genetics knowledge zone’ involves seedstock breeders, breed societies, genetic evaluation service providers (e.g. ABRI, Zoetis), genetics R&D and specialist extension agents. This network functions reasonably and is partially coordinated by MLA projects SBTS and TBTS. The ‘production zone’ includes some seedstock breeders, commercial breeders and agents that service that sector. Beef genetics extension does not appear to have a coordinated way to reach people in this zone. This represents untapped potential due to the benefits that could accrue from greater, regular contact with commercial breeders. The production zone is vital because it has the potential to provide pull through to the seedstock sector for faster genetic improvement. The influence map identifies six categories of breeders classified by function (seedstock, commercial) and level of adoption of technologies. Some breeders may belong to more than one category; for example some pastoral companies will buy bulls on objective measures and breed bulls for own use.



2.1.2 The different genetics mindsets

Of particular importance is the different mindsets of the people within the two zones. The delivery of any network activities needs to accommodate these different mindsets. The different mindsets of people within the genetics knowledge zone and production zone have been encapsulated in illustrations created by Dodd et al. (2015).



As the 'blue head' illustrates, those operating within the genetics knowledge zone tend to 'live and breathe' genetics. They have a very high level of interest in beef genetics, are highly motivated to seek information and have developed extensive genetics knowledge and expertise. Being highly interested and motivated, people in the genetics knowledge zone are well networked with other people working in beef genetics and actively participate in research and extension activities on offer.

As illustrated by the 'brown head', people in the 'production zone'– including commercial producers and those who advise and influence producers – are interested in genetics only as one of many issues that combine to affect the farming system and business profit.

The choice of language is very important when communicating with these different mindsets. For example, the word 'genetics' will appeal to those in the knowledge zone, as it represents their passion. Those in the production zone, are likely to relate better to language associated with the practical application of genetics such as fertility.

2.2 Recommendations for an industry-wide beef genetic extension network

The network's delivery vehicles have been designed to address the key recommendations from the project team. These recommendations are highly consistent with the recommendations made by RMCG (2015) and Lee & Pitchford (2014). Recommendations fall within three themes:

A. Rethink the way genetics messages are presented and delivered to commercial producers.
B. Build genetics knowledge capacity in both the production and the genetics knowledge zones.
C. Develop resources and tools to apply genetics on commercial beef operations.

A. Rethink the way genetics messages are presented and delivered to commercial producers

	Recommendation	How addressed by network
1.	Integrate genetics into existing extension programs such as 'Future Beef' (Qld) and Better Beef Network (Vic).	Separate project to develop resources & tools.
2.	Re-develop genetics messages within a farm systems context (with a 'fertility' hook in northern Australia; 'supply chain' hook in south).	Proposed Northern Fertility Project & Southern Supply Chain Project
3.	Offer opportunities for commercial producers to discuss beef genetics with other farmers and advisors, without having to travel.	On-line discussion groups
4.	Create conversation about genetics utilising existing media and social media such as 'Beef Central' (email newsletter), Facebook, Twitter, web and text messages – first 12 months funding to include monitoring/evaluation.	Awareness campaign
5.	Develop a monitoring and evaluation system for network activities.	Separate project or independent evaluators
6.	Investigate funding opportunities for projects that address reducing carbon emission through beef genetics (possibly via influential advisor groups)	Separate project

B. Build genetics knowledge capacity in both the production and the genetics knowledge zones

	Recommendation	How addressed
7.	Offer a forum to engage with influential beef advisors for professional development to create opportunities to build genetics messages into their everyday activities (i.e. genetics in the overall farming system/business). Multidisciplinary and multispecies.	Pilot 'Influential advisor groups' modelled on DAFF's Carbon Farming Knowledge project
8.	Provide formal training and mentoring by professional geneticists and extension specialists for the next generation of genetics experts. Support for finding employment/on-going experience in beef genetics, either within the genetics knowledge zone or in the production zone; ensure this apprenticeship provides equal exposure to the genetics knowledge zone and the production zone.	Apprenticeships for specialist training in genetics
9.	Update formal secondary and tertiary genetics training with more applied knowledge e.g. incorporate into University degrees, modules on Breedplan and use of genomics tools in beef breeding.	Separate project involving Breedplan, AGBU, ABRI and a university representative and network co-ordinator
10.	Facilitate robust discussion between key influencers in the production zone and the genetics knowledge zone.	Annual national forum

C. Develop resources and tools to apply genetics on commercial beef operations

	Recommendation	How addressed
11.	Develop a genetics benchmarking tool for commercial herds – including an app.	Separate project to develop resources & tools for use by network.
12.	Continue and enhance current genetics extension activities in the genetics knowledge zone. Look for enhanced opportunities that move all seedstock breeders into the knowledge zone.	Continue and enhance SBTS, TBTS, AGBU. Investigate role of private consultants.
13.	Demonstrate the value/opportunity for genetics to contribute to the business – these demonstrations (Proof of Profit) need to be local and practical. Refer Recommendation 1, Lee and Pitchford (2014).	Separate project to develop resources & tools for use by network.

3. Proposed beef genetics extension network

The proposed Beef Genetics Extension Network would have five main roles, aimed at extending the existing network to include influencers in the production zone and overcoming barriers to adoption identified in reports ABRI (2015) and Nicol (2015):

- Raise awareness of the role/contribution of genetics within the whole beef production system.
- Facilitate discussion about genetics by commercial beef producers (within whole farming system context).
- Facilitate discussion about genetics by influential advisors (within whole farming system context).
- Facilitate robust discussion and debate about genetics between genetics specialists and influential advisors and thereby provide a 'real world' influence on the priorities of those within the knowledge zone.
- Identify needs for extension tools, resources and genetics training; facilitate the development of these and determine delivery mechanism; pilot test new initiatives; roll out new initiatives (unless there is a logical existing project for long term delivery (e.g. Northern Fertility Project or Southern Supply Chain project).

To be successful, a coordinated network will need to:

- Ensure messages are technically sound.
- Place considerable emphasis on the practical application of genetics in commercial herds.
- Be driven by someone with the production focus (not genetics knowledge focus) and include people from both the genetics knowledge and production zones
- Employ innovative and novel approaches to reach people beyond the genetics knowledge zone.
- Encourage highly influential advisors to integrate genetics into their 'toolbox'.

The above criteria would be valuable for monitoring progress during the early period of implementation.

Six main delivery vehicles are proposed, which collectively can address the recommendations outlined earlier in this report. Each of these concepts is described later in this report.

1. On-line discussion groups.
2. Influential advisor groups (north and south).
3. Forum(s).
4. Applied genetics awareness campaign.
5. Existing extension initiatives.
6. Special projects.

The network's role would be to develop and pilot test these delivery vehicles and if successful, determine the most logical delivery outlet for the longer term e.g. proposed 'super' multidisciplinary projects (see later).

3.1 Co-ordination

Network co-ordination will bring together a broad spectrum of people interested in genetics and beef production to promote a greater understanding and use of genetic technologies across the entire beef industry. Stakeholder feedback and recent reports by Dodd et al. (2015) and Lee & Pitchford (2014) show that current genetics extension activity is focussed on seedstock breeders who performance record. Greater adoption of genetic technologies in the production zone will increase the number of cows mated to superior bulls and create pull through in the seedstock sector.

Extension with seedstock breeders has been successful as evidenced by the increasing rate of genetic gain within seedstock herds that are participating in Breedplan (SBTS and TBTS annual reports). However the genetics specialists servicing seedstock breeders (breed societies, SBTS and TBTS) do not have good penetration into the commercial breeding sector, nor do they have the expertise to communicate genetics in the context of a commercial farming system. Feedback suggests that the coordination of the national genetics extension network should not be in the hands of genetics specialists in the knowledge zone.

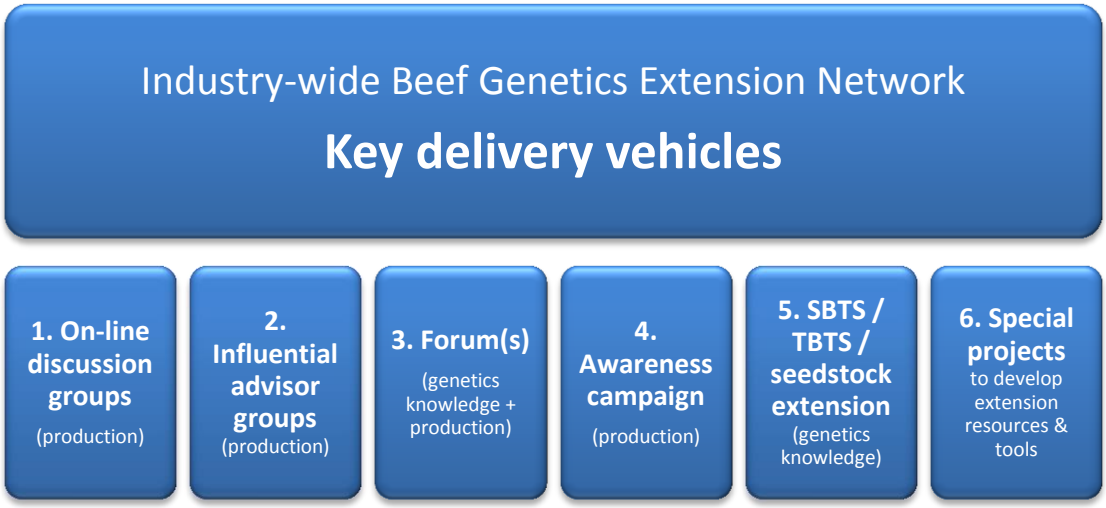
Co-ordination of genetics extension needs to include the commercial breeding industry, the beef supply chain and the service agents associated with that sector. The product delivered to the commercial sector must change radically if genetics is to have traction with the commercial breeding industry or the production zone; this product is discussed in detail in the section dealing with the delivery vehicle – 'Awareness'.

Members of the influential advisor group(s) will serve a dual purpose: they are part of the group because they influence commercial producers and are interested in pursuing knowledge on genetics as it applies to beef enterprises but they are also operators in touch with members of the production zone and their feedback on genetic network initiatives will be invaluable. These members will meet via electronic media bi-monthly and face-to-face annually and their feedback on genetic initiatives will assist in coordinating the production zone network.

The process of coordination needs to be done by a group of people interested in genetics across the entire national network rather than a single person. In the past genetics research has been directed by a consultative committee and this has not only been successful in setting priorities for genetics research but has established links between research bodies and influential members of the industry. It is proposed that a similar process be developed for extension coordination. Members of influential advisor groups (in part or whole) will help

coordinate from the production zone with other key influencers from across the entire network included.

Coordination will need a convener to ensure continued operation of the groups involved. The convener would maintain web and Facebook pages and release text or email messages on behalf of the coordination group plus ensure the group continues to function.



3.2 Role of communication

While communication is central to a successful network, the ultimate success comes down to relationships; that is, a web of on-going conversations and collaboration between members of the network.

One-way communication – such as providing information, resources and tools – is important, but of limited value unless there are mechanisms to maintain existing relationships and facilitate new ones.

Commercial beef producers in the production zone are not interested in genetics specifically, but in the context of how genetics will fit into their overall farming system. It is important to communicate with these groups through channels they already use, trust and value; such as state departments of agriculture, retail field staff (e.g. Landmark, Elders), agronomists, agents, vets etc. The initiatives outlined in this document are designed to stimulate their interest, and build their knowledge of the practical application of genetics on commercial farms.

Similarly, the network should utilise and enhance the existing communication channels used by the commercial sector such as rural media (print, radio and TV) and digital/social media.

Seedstock breeders are generally more genetics focused than commercial breeders and communication programs that feature genetics will have a high chance of success. The current communication channels between breed societies, ABRI, SBTS, TBTS, AGBU, genomic companies and semen companies are reasonably successful but there appears to be a significant number of disaffected seedstock breeders especially in the north, who don't make use of genetic technologies. This group needs to be further evaluated to ascertain if the method of communication or the messages being communicated need changing. Communications within this network should be enhanced with use of more social or digital media activities and coordination could be streamlined.

3.3 Training and capacity building

Genetics knowledge zone: The team of genetic specialists within the genetics knowledge zone is so small that when a vacancy occurs it is difficult to fill with personnel with adequate applied genetic knowledge and experience in communicating with farmers. Further the limited employment opportunities and uncertain career path means potential workers are unlikely to pursue appropriate training. Positions tend to be filled by people with adequate formal education but very limited applied knowledge and the effectiveness of the employee is limited for a relatively long time while on-the-job training occurs. Funding should be made available for 'apprenticeships' for genetic professionals so they are ready to move into positions as they become vacant. These apprenticeships should undertake a period of diverse intensive training with R&D units such as AGBU, service providers such as ABRI and face-to-face extension personnel such as TBTS or breed society extension specialists.

Production zone: Beef producers in the production zone are serviced by generalist advisors and service agents as described in 'Role of Communication' section above. These advisors and service agents rarely have high levels of knowledge on genetics but they are highly experienced and trusted advisors in the commercial beef industry who have worked with their client base for many years. There is an urgency to address this problem by funding innovative programs to build capacity of these operators to integrate genetics with their farming enterprise advice.

The secondary and tertiary education systems are responsible for the basic education of the next generation and it is generally accepted that they supply largely academic rather than vocational education. However there would be a significant advantage in making genetic technologies part of the language of the industry by introducing concepts of applied genetic technologies at an early stage.

The proposed model would address training and capacity building through influential advisor groups, forums and special projects (see later in this report), and by integrating genetics into whole farm systems (multi-disciplinary, 'super' projects)

Rarely do farmers, especially commercial breeders think of genetic improvement in isolation - their interest in genetics focusses on how it fits in their overall enterprise. As such it is proposed that two multi-disciplinary projects be developed that would have a significant genetics contribution but not as the main focus. Genetics messages would have an 'applied/commercial' focus, to appeal to the production mindset as defined by Dodd et al. (2015).

Possible initiatives could be:

- The Northern Fertility Project for Northern Australia.
- The Southern Supply Chain Project for Southern Australia.

While it is outside the scope of this project to detail these multi-disciplinary projects, the team considers that the two focuses chosen are appropriate for the two geographical zones and we put them forward for consideration. If MLA chooses not to develop these two projects we strongly suggest that a multi-disciplinary approach is adopted.

The Northern Fertility Project would use the latest and best available knowledge on nutrition, male and female management, reproductive soundness and genetics to improve the weaning rate of northern herds. The project would draw upon the network's six delivery vehicles, including awareness activities such as on-farm case studies where practice change can be monitored. Forums will be used to allow participants to gain information and influence directions for R&D (genetics and other issues affecting fertility). Refer appendix 3 for more details.

The Southern Supply Chain Project would also adopt a multi-disciplinary approach from nutrition through to marketing and promote the value of genetics at each stage of the supply chain. Refer appendix 4 for more details.

4. Recommendations for Phase II: implementing a beef genetics extension network

To establish a beef genetics extension network, the priorities for the first year are to:

- Form an advisory group.
- Appoint a convener.
- Investigate funding opportunities for projects that can be linked to reducing carbon emissions.
- Implement priority deliverables:
    - Start up an awareness campaign using innovative and novel approaches.
    - Pilot test one or more on-line discussion groups.
    - Develop concept and source funding to pilot test one or two influential advisor groups.
    - Identify priorities for special projects, develop concepts and source funding.

- Contribute (the genetics perspective) to scoping the concept of super-projects (Northern Fertility Project and Southern Supply Chain project) if MLA elects to proceed.

Advisory group

It is recommended that an industry advisory group (max 10 people) be formed to oversee the formation and evaluation of the beef genetics extension network. It is essential that at least half the people on the group come from the production zone and the expertise represented should be extension focussed rather than science (genetics focussed). While this group would need to initially meet face-to-face (to establish relationships), most of its meetings should be able to occur via conference/webex call. This advisory group in later years may morph into the extension consultative group.

Convenor

The coordinator of the national genetics extension network may act more like a convener of the extension consultative group ensuring that the group operates to coordinate the network and that the awareness initiatives are on-track.

5. On-line discussion groups

The concept

Groups of 5-10 people who have an interest in improving genetics in commercial herds. Focus is on the application of genetics within the farming system (not technical genetics). The format would be predominantly digital i.e. the group meets via Webex or similar service (a computer/tablet-based tool that enables the combination of conference call and presentation sharing).

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 are on-line. Key principles:

- Driven by farmer members, meeting approximately monthly or bi-monthly.
- Supported/facilitated by a respected advisor (public or private), but function in similar way to conventional discussion groups i.e. increasingly self-led etc.
- Invited guest (or on-going) participants such as technical specialists, as determined by farmer members.

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.

Purpose

Dual purpose: farmers/advisors co-learn more about application of beef genetics; genetics specialists learn more about farmer needs; and how Breedplan and other projects can better serve commercial farmer needs (facilitator must ensure that it does not turn into a patriarchal relationship with the genetics specialist teaching the rest of the group).

Target audiences

Primary target audience: Commercial beef producers with an interest in using genetics to improve their productivity and/or profitability of their beef enterprise.

Secondary audience: beef advisors, genetics apprentices

Proposed pilot

To test the concept, it is proposed to work through Bill Hoffman, a highly respected beef advisor who currently runs several conventional discussion groups. These groups are suggested as pilots because they are already familiar with working in a group environment and sharing information. The focus of the groups is cost-of-production but activities range from marketing to pastures and genetics. The groups have also been involved in More Beef from Pastures activities.

Desired outcome

Commercial beef producers have a forum to discuss the practical application of genetics in context of their overall business considerations.

Evaluation criteria

A brief participants' survey before starting; and after 12 months of operating. Most members have also been exposed to More Beef from Pastures activities and accustomed to evaluating activities.

Debriefing interviews with facilitator and guest participants.

6. Influential advisor groups

The concept

The concept is be based on the successful GRDC Carbon Farming Knowledge initiative that aims to enhance the capacity of advisors to the cropping industry to introduce carbon farming technology with their cropping clients (carbonfarmingknowledge.com.au). There is a parallel between carbon farming and genetics in that the benefits to the farmer are not immediate and obvious.

Selected trusted beef industry advisors from both the public and private sector will be invited to join a network 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. This is consistent with RMCG (2015) recommendation II: as well as Lee & Pitchford (2014).

Purpose

Stimulate influential advisors' interest in, and knowledge of, the practical application of genetics in commercial beef operations.

Target audience

This extension program's target audience is highly experienced and trusted advisors in the commercial beef industry who have worked with their client base for many years. This network of key advisors has become critical in influencing farm management decisions as traditional state governments extension services have declined.

These advisors understand the complexity of farm management and commercial beef production. The initiative would assist advisors and their networks build their capacity to deliver effective messages on assessing the performance of their clients' herds and the opportunities associated with genetic improvement.

Members of the Beef CRC champions group should be considered as potential members of this group.

Proposed pilot

The program involves a group of key independent trusted farm advisors getting together twice a year for a two day workshops. The objective is to build their knowledge of genetics technology and how it can assist the productivity and profitability of their beef producing clients.

A formal 'classroom' format is not suitable for these participants as they are highly experienced and well respected for their knowledge and expertise. This audience requires a highly interactive, collaborative learning format with the opportunity for participants to have an input into the topics covered, specific activities, farms visited and guest speakers.

The program would provide participants with professionally delivered training, mentoring and access to leading researchers, seedstock producers etc. and peers, to develop the appropriate technical understanding and skills to effectively facilitate change in the use of genetic technology in everyday beef operations.

The workshops would help trusted advisors define key messages and package the information in a way that will provide simple activities that they can adopt with their commercial beef producing clients

Some of the key elements of the Carbon Knowledge Project that should be incorporated into the design of the beef pilot:

- The advisors get paid an annual stipend to so they don't suffer a net loss and there would be support for advisors to run their own events on genetic improvement. In return each advisor commits to the discussions and monitors progress from current knowledge at the start of the program to practice changes at the end with a number of their key clients.
- The program would have a website containing information on the project, information for beef producers, a list of the consultants involved and a consultant portal where consultants can access transcripts and presentation from all workshops, fact sheets and materials to use with their clients, tools, worked examples and the latest information.
- Advisors would be kept up to date with a regular e-newsletter linking back to the website.

Evaluation criteria

DAFF's Carbon Farming Knowledge project will undergo evaluation in November 2015. Experience from this evaluation should inform both the development and evaluation of the pilot influential advisor groups.

Each advisor commits to genetics discussions with their clients and monitor progress from current knowledge at the start of the program to practice changes at the end with a specified number of at least five of their key clients. Knowledge, skills and attitude change in the advisors can be monitored by a survey at enrollment and after 12 months experience in the program.

7. Forum(s)

A national forum – if delivered in a collaborative and interactive format – could help provide direction and identify priorities, and create cultural change, but only if it could attract representatives from both the production zone and the knowledge zone. The concept of a forum or regular workshop was suggested and supported at the Ekka workshop and Lee & Pitchford (2014). Forums have successfully been used in the past to focus industry on the genetics message. Such forums as 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.

Elements could be adopted from the dairy industry's successful biennial genetics event (Herd '15) which brings together a diverse range of people who influence dairy farmers' breeding decisions.

We propose that the national forum or regional forums are an agenda item for the genetics advisory group and will be planned and delivered at the end of the first 12 months of operation should the group believe it is warranted.

8. Awareness campaign

The concept

Utilise media (including social media) that are already respected and used by the beef industry (particularly in the production zone) and introduce and evaluate new methodologies.

Genetics messages should have a practical/applied focus and be consistent with those being delivered through initiatives such as the Northern Fertility Project and the Southern Supply Chain Project or activities of the on-line discussion groups. Approaches should be made to established beef information sources (e.g. Beef Central) to include genetics awareness information

Purposes

1. Raise awareness of the role/value of genetics within the whole beef production system.
2. Stimulate conversations about the application of genetics in commercial beef operations.
3. Deliver clear consistent messages about the practical application of genetics and its value to commercial beef operations.

Target audience

Commercial beef producers and the people who influence them (production zone)

Potential activities

In the first year is suggested that a small-scale awareness campaign operate in the first year. It can be scaled up once genetics messages have been re-developed for audiences in the production zone (i.e. focussing on practical application of genetics). Potential activities could include:

- An annual promotional plan, outlining the year's key messages, relevant timing considerations, key target media, responsibilities and deadlines.
- Case studies from commercial farmers where the value of improved genetics can be demonstrated (may need to draw upon proof of profit special project)
- Monthly 'newsletter grabs' – very concise media release focussing on a key extension message that is relevant for the time of the year (including supporting Facebook posts and twitter feeds)
- Monthly practical genetics articles for key beef industry media (*Beef Central*, *Feedback*) – using farmer testimonials as drawcard and supported by comments from genetics specialists.
- Studs looking to market bulls will be invited to contribute a short feed as long as it meets certain criteria e.g. must mention EBVs, indexes that are supported by facts.

A high priority for the first year would be to develop a series of farmer case studies/testimonials. Research has consistently shown (Blair et al. 2015) that farmers prefer to learn from other farmer's experiences. Consider using a team to prepare the case studies: a professional writer in collaboration with a consultant who can do an analysis of the farm's financials to provide a proof of profit analysis. Case studies can be prepared so that they can be presented in multiple formats (print, audio, video, quick quotes etc.).

Desired outcome

Messages in the media are consistent with those delivered through the influencers in the beef genetics network.

Evaluation criteria

- Media monitoring (number of articles published, twitter feeds etc.).
- Changes in attitudes by commercial farmers towards genetics (either a follow up of Dodd et al. 2015 or incorporated through on-going MLA's quantitative monitoring of farmer attitudes).

9. SBTS, TBTS and breed society extension initiatives

The concept

The current extension activities have been successful as described by the SBTS and TBTS annual reports and Parnell (2015). Consultations by the project team found that stakeholders were generally supportive of their value. These extension activities should be continued and enhanced. Supporters should be aware however that these activities are strongly dependent on available personnel and that efforts to increase the size of the pool of available experts should be vigorously pursued.

The strong links to ABRI and breed societies may be excluding the application by a small number of seedstock herds who are outside the recognised structure (pers. com. Popplewell

and multiple responses at the Ekka workshop). Other possible activities should be considered such as BreedLeader delivered by private consultants.

Purpose

This will be the main vehicle that will continue to improve the rate of genetic gain in the seedstock herds.

Target audience

Seedstock herds and associated services which are located in the knowledge zone of the network.

Desired outcome

Continuation of the activities in the knowledge zone will continue to increase the rate of genetic improvement and promotional activities should encourage more breeders to move into using genetic technologies to make improvement.

Evaluation criteria

Measure practice change by monitoring the average rate of genetic progress for seedstock herds and the number of herds using advanced recording practices as shown by completeness of recording and TakeStock tools. Other evaluation may be used to evaluate awareness created by these initiatives.

10. Special projects to develop extension resources, tools and capacity

The concept

If successful, the beef genetics extension network will create a vigorous dialogue between the end users of beef genetics (commercial producers), their key influencers and people in the genetics knowledge zone. An important outcome of this dialogue should be the identification of the need for specific extension resources, tool and training. Special projects should be developed to address these specific needs.

Immediate priorities for special projects

This team has identified the need for the following special projects; others may evolve with time:

- Proof of profit (Lee & Pitchford 2014 recommendation 1).
- Apprenticeships for genetics specialists.
- Update formal secondary and tertiary genetics training and course content.
- App to find sale bulls with nominated criteria (Martias Suarez per comm).

Proof of Profit

The approach suggested by Lee & Pitchford (2014) is supported by this project team. We would suggest that the criteria for publishing value could also include the possible effect on carbon as well as the financial and productivity indicators.

The other rich source of demonstration material should become available through the Beef Information Nucleus (BIN) programs being conducted by some of the major breed societies. While they are by design under controlled conditions, they are conducted on commercial properties and the sires being evaluated are current and the same pedigrees will be represented in bulls available for purchase. There is a number of other within herd progeny test programs that should also be investigated for their promotional/extension possibilities.

Herd case studies being evaluated as part of the influential advisor project could be used to encourage testimonials and develop champions. The bull purchasing records should be investigated to estimate genetic merit within a herd and assess change in buying habits. If this can be associated with an expression of attitude change by the herd owner it will form the basis of a 'good news' story.

Apprenticeships for genetics specialists

There are a limited number of people with specialist genetics expertise operating in the genetics knowledge zone and it can be a challenge to replace these people if they leave the industry. A plan needs to be put in place to ensure an ongoing skill base of genetics specialists is developing to take up key industry positions as they become available.

An 'apprenticeship' program would ensure the next generation of genetic experts receive formal training and mentoring by professional geneticists and extension specialists. A well-structured program would provide equal exposure to the genetics knowledge zone and the production zone, as well as support for finding employment/on-going experience in beef genetics.

Update formal secondary and tertiary genetics training and course content

As discussed in the section on Training and Capacity Building, the current secondary and tertiary education opportunities do not contain sufficient applied knowledge on genetic technologies such as Breedplan, Sheep Genetics or the role of genomics. A small working party should be commissioned to review the current syllabus content of relevant agricultural courses and suggest changes. The genetics extension convener should be part of that working party and once developed the coordinating group for genetics extension would be charged 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.

11. Issues to address for the network to succeed

Some stakeholders consulted during the development of this report volunteered responses on aspects of Breedplan and other genetic evaluation and promotion issues that are outside the scope of this project, but impact on the ability of an extension program to be national and coordinated.

Breedplan structural issues

Small breeds do not have the same access to services as larger breeds; the example most quoted is that not all breeds have a published days-to-calving EBV. AGBU has an unwritten rule that unless a breed has 5000 records it shouldn't publish an EBV. The counter argument is that the availability of a published EBV will encourage more records. Problems of not having correct genetic parameters without an adequate database is offered as reasons for such restrictions but this was considered by some respondents, secondary to having an EBV available and the advantages that would bring. Breedplan was first published using parameters from the US; Shorthorn breeders would be happy to start publishing a days-to-calving EBV using Angus or Hereford parameters and similarly Droughtmaster would be happy with Santa Gertrudis or Brahman parameters.

There are a number of breeders who, for reasons of their own or due to society rules, are not able to record their cattle with a registered society. To cater for these, Breedplan should consider alternatives that allow recording of crossbred and purebred animals and allow linkage between like-minded herds for an across herd evaluation. Due to some of these frustrations there are a number of herds who are conducting genetic evaluations outside the Breedplan system. It will add a level of complexity if these herds are not included in an extension network as it is likely that the language and terminologies will not be consistent.

There are calls for the monopoly control of Breedplan by ABRI and breed societies to be reviewed.

Research data

Much data has been generated by public funded research projects, including Beef CRC that find application within Breedplan and raw results are not made available to other entities. However some of this data would have application for other systems outside Breedplan and requests for this data to be released for these development purposes must be given some consideration.

Re-consider the language/terminology around breeding values

The information supplied in sale catalogues for bull buyers while technically correct and detailed is generally more than the average bull buyer will read and comprehend. There is a need to implement a system that evaluates a potential purchase at a glance. Preference is a motel type star system rating based on the percentile as used in the some Irish semen catalogues. These would be on one page in the catalogue that is a reference page. The catalogue does not need to be dumbed down; all other information should still be available for enthusiasts. We note that Ireland has moved to such as system (ICBF 2015)

Develop smart tools for genetic management

There are current initiatives to develop tools (apps) for finding suitable bulls for commercial bull buyers. These should be supported and developers should be encouraged to include some safeguards or warning signals where a selection strategy is likely to result in loss of production e.g. a selection policy based just on growth is likely to result in increased calving difficulty and may lead to lower profitability. The same tool has potential as a benchmarking system where the past buying history of the herd is used to estimate the current genetic merit of the herd and plot where the purchases being considered would sit compared to this estimate. With the recent spate of undesirable genetic recessive conditions, the industry is fearful of the 'next' problem and will sacrifice production to avoid inbreeding. Inbreeding needs to be included in this tool development.

Appendix 1: Consultations

People consulted with in development of this report

Individually

Lindsay Barlow, Brangus breed society
Andrew Byrne, Angus Society
Alf Collins (junior), Brahman breeder
Robert Banks, AGBU
Christian Duff, Angus Society
John Gibson, UNE
David Greenup Santa Gertrudis seedstock breeder
Tom Gubbins, Angus seedstock breeder
Tim Hollier, Department of Economic Development, Jobs, Transport and Resources
Peter Haynes, NAB rural manager, Armidale
Bill Hoffman, Hoffman Beef private consultant
Steven Lee, Adelaide University
Alex McDonald ABRI/SBTS/TBTS
Catriona Millan, ABRI/SBTS/TBTS
MLA Genetics consortium
David Murray, Angus seedstock breeder
Wayne Pitchford, Adelaide University
Peter Parnell, Angus Society
James Rowe, Sheep CRC
Steve Skinner, ABRI
David Johnston, AGBU
Nick Pearce, PIBA rural manager Armidale
Greg Poppelwell, Composite breeder, private genetics consultant
Matias Suarez, Department of Primary Industries Agriculture NSW
Mick Sullivan, DAF Q
Adam Turnbull, Senior Sales Representative, Zoetis

Brisbane 'Ekka' workshop 5 Aug 2015

Steve Banney, Northern Pastoral Group
John Bertram, TBTS, Beef genetics extension
John Bowler, Droughtmaster breed society
Nick Cameron, Composite breeder
Krista Cavallaro, DAF Q beef extension
Brett Coombe, Brahman breeder
John Croaker, Brahman breed society
Tim Emery, DAF Q beef extension
Sam Gill, MLA
Rodger Jefferis, Brahman breeder
Burnett Joyce, Santa Gertrudis breeder
Russell Lyons, UQ Animal Genetics lab,
Alex McDonald, ABRI/TBTS
Don Nicol, Breedlink
Ben Noller, Santa Gertrudis breed society
Emily Piper, Zoetis
Jane Wightman, MLA
Paul Williams, TBTS

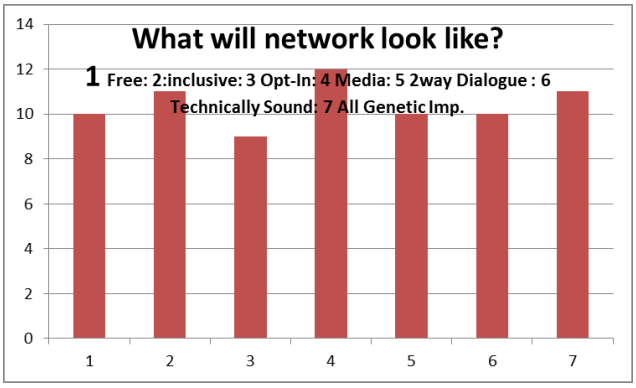
Appendix 2 EKKA Workshop Responses

Below is a summary of the responses that were received from participants at the workshop in Brisbane. We have tried to paraphrase the comments and collect them into themes that will influence recommendations in our final report. From this information and other collected earlier the project team has concluded that beef genetics involves two networks that overlap and interact (see the diagrammatic representation at the end of the report). There appears to be an overwhelming call for more activity in the network servicing the commercial breeders to create pull-through. There is no suggestion that the activity in the 'knowledge base' network should be reduced but coordination is necessary for effective extension delivery for these two networks.

Objective responses

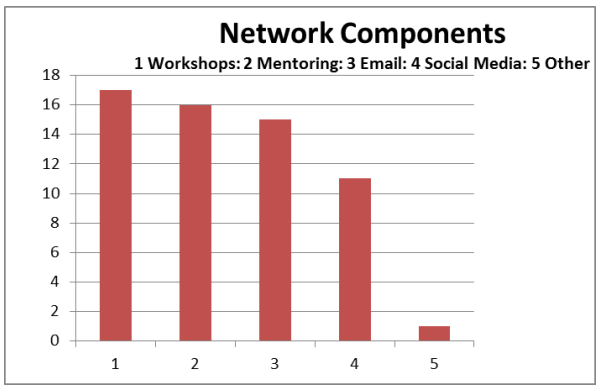
	Yes	No	Don't Know
Do we need a coordinated network	17	0	4
Does a network exist?	13	3	5
Should this network be coordinated?	17	0	3
Can coordinated network increase gain	18	0	3

The network



- A network already exists but it doesn't reach all players in the industry.
- Messages must be technically sound, consistent.
- Need some innovative approaches.
- Once off workshops not adequate; need follow-up.
- Some real players are not included in this meeting but probably should be.
- The network needs champions.
- Informal networks at project level.

Network Activities



- Training new personnel – mentoring.
- Must critically address the commercial industry.
- Two way dialogue.
- Need to convene regular contact of small group such as those in attendance at EKKA meeting.
- Needs branding.
- Digital presence essential.
- Regional examples of increased $$.
- Look at BINs for demonstrations of EBVs working.

Inclusion of players not currently using genetic technologies

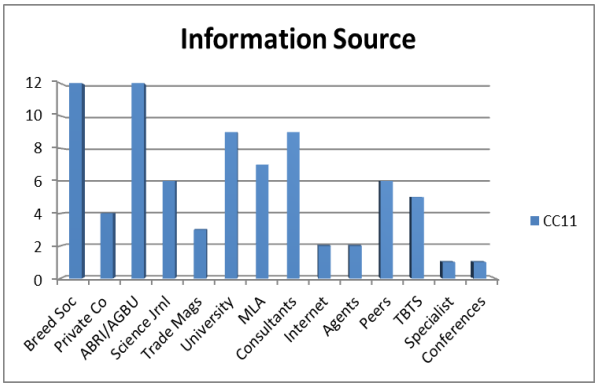
- Value proposition for those not involved.
- Social events such as Beef Week not exploited for extension of genetics.
- Need to include some important players who are outside current network.
- Genetics must be part of whole farm management.
- Genetics improvement is not visible – exception is number of calves – genetics of fertility is opportunity for northern extension.
- Feedlots, vets, agents, banks, RCS (Rural Consultancy Services, McCosker).
- May need new marketing approach.
- Current structure of the genetic evaluation system needs to be reviewed – breed society alignment limits access from some operators.

Value of coordination

- Some suggestion that until program developed there is nothing to coordinate.
- Needs a goal around which extension can be coordinated eg. Increasing fertility in the north
- Coordination could speed up uptake.

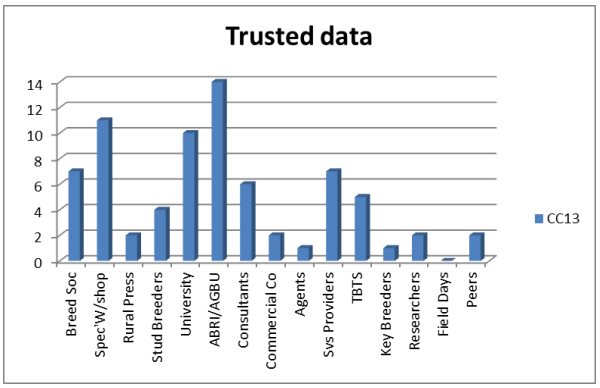
What are we trying to achieve?

- Faster rate of genetic gain in industry – more cows mated to improved bulls and faster rate of genetic improvement.
- Appreciation of value of genetics by commercial industry to create pull-through.
- Create a two-way flow of information instead of one way flow from stud (breed society) to commercial.
- Resources stretched and concentrated in stud/breed society sector – need to investigate resourcing the commercial breeder sector.
- Build capacity – who's going to be around in ten years?



Major Influencers

- Need to engage more influencers that should value genetics e.g. meatworks.
- Proof of Profit – maximize use of existing demonstrations.
- Make better use of influential breeders.
- R&D, genomics companies and ABRI are influencers.
- Pull-through could come from feedlots and processors.
- Broaden network beyond seedstock sector – current system too seedstock focused.
- Vets, agents, processors.



Constraints to Adoption

- Inertia – producers are conservative and don't see a reason to change.
- Very few advisors can give good advice on crossbreeding or composites.
- Extension and communication have been deliberately and jealousy controlled by select few.
- Most producers believe they are making genetic progress – definition of genetic progress? – Don't see a need for change.
- Current extension doesn't use best extension principles.
- Message too complicated and not directed to bull buyer.
- Resources.

Appendix 3: Northern Fertility Project

The concept

This concept is an example of how a beef genetics extension network might operate in northern Australia. It also addresses the RCMG (2015) recommendation # 7: 'Begin learning with increasing producers understanding of current performance and opportunities for their business. Feedback from our independent stakeholder consultations indicated that genetics should be extended as part of the complete enterprise plan rather than a stand-alone topic, supports this concept.

The Northern Fertility Project would be a multidisciplinary extension project, customised and delivered for commercial and seedstock herds in northern Australia, with the overall aim of improving fertility rates in commercial-scale beef operations (exclude hobby farms). The multidisciplinary approach is consistent with the production focussed mindset of commercial farmers as described by Dodd et al. 2015 and RMGC (2015).

It would address the variety of ways farmers can improve herd fertility, including genetics, current herd selection (males and females), nutrition and management. The project would build on the Cashcow project that was conducted between 2007 and 2012. The availability of new genetics tools warrants development of a new project.

(https://futurebeef.com.au/resources/projects/completed-projects/northern-australian-beef-fertility-project-cashcow/).

Purpose

Provide extension activities, resources, tools and training to support beef producers in improving herd fertility.

Target audiences

- Commercial beef producers in northern Australia
- People who influence commercial beef producers in northern Australia (refer influence map)

Proposed development approach

The development phase of the project would create a set of extension activities, resources and tools to assist farmers in adopting best management practices that can contribute to improved herd fertility.

The project will tackle three levels of delivery of knowledge, awareness, improvement of knowledge, skills and attitude (KSA) and practice change.

The delivery phase would use some or all of the innovative vehicles as outlined in the Beef Genetics Extension Network, including:

- Awareness campaign.
- On-line discussion groups.
- A (possibly national) fertility (or genetics) forum to bring together genetics and other fertility specialists and influential advisors (production zone).
- Influential advisor groups.

Success of awareness campaigns will be monitored by email 'satisfaction' surveys. KSA change will be effected largely through the on-line discussion groups and forums. Success

will be monitored by exit surveys of the events. A percentage of those involved in the discussion groups, forums and clients of Influential Advisor Group members will make changes to practices related to genetic management within their herd. These changes will be monitored by genetic benchmarking across years.

Desired outcome

Increase the number of beef cows in northern Australia that are joined to genetically superior bulls.

Evaluation criteria

Evaluation would be designed as part of the overall project. The genetics component could be evaluated using techniques to evaluate KSA that will occur as part of the coordinated integration of genetics into the overall message.

Appendix 4: Southern Supply Chain project

The concept

This concept is how a beef genetics extension network might operate in southern Australia.

It also addresses the RMCG (2015) recommendation #2: “contextualise both information and training into a direct value chain opportunity for producers”. The Southern Supply Chain Project allows genetics information and technology to be extended as part of a whole farm system that can improve farm profitability.

A number of supply chains already exist in Southern Australia– either based on a location (JBS -King Island Beef), a breed or a specific bloodline (Blackmore Wagyu, CAAB) , management philosophy Gippsland Natural) or a processor’s brand. Existing supply chains vary enormously in the flow of information back to producers and the support provided to producers to tailor their production to improve profitability.

The Southern Supply Chain Project would be a multidisciplinary extension project which would work with existing supply chain groups and support the formation of new supply chain groups (such as those recently proposed by Teys, Beef Central 14/10/2015). It would encourage processors to give producers clear and concise information about the value of their cattle and reward beef producers for the quality of the beef they produce. It would provide processors and producers with education on the revenue drivers across the supply chain.

Producers would be supported with extension information to assist in making farm management decisions which help them meet processor grids specifications. This would include genetics, grazing management, animal health, marketing and transportation. This is consistent with the production focussed mindset of commercial farmers as described by Dodd et al., 2015 and RMCG 2015). Processors would be supported to run supplier groups which could meet regularly to discuss aspects of on farm production and utilise the extension information and create a forum where farmers could learn from each other’s experiences (Blair et al. 2015)

Purpose

Provide extension activities, resources, tools and training to support beef producers and processors improve communication in the supply chain and adopt on farm practices which help meet processors specifications and optimise returns.

Target audiences

- Commercial beef producers in southern Australia
- Processors, Feedlotters

Proposed development approach

The development phase of the project would involve working with a number existing supply chain partnerships to provide a set of extension activities, resources and tools to assist farmers in adopting best management that help them produce beef to the processor’s specifications. The project would work with processors to ensure information flowed back to producers and could be used to tailor on farm production.

The project will tackle three levels of delivery of knowledge, awareness, improvement of knowledge, skills and attitude (KSA) and practice change.

The delivery phase would use some or all of the innovative vehicles as outlined in the Beef Genetics Extension Network, including

- Awareness campaign amongst a processor's suppliers
- On-line discussion groups
- Forums as deemed necessary by project organisers
- Influential Advisor Group
- Special projects to develop resources and extension tool which can be used by processor groups

Success of awareness campaigns will be monitored by the participation of a processors suppliers. KSA change will be effected largely through the support given to processors and their suppliers through discussion groups, forums and the support these groups receive from trusted advisors participating in the Influential advisor project Success will be monitored by assessing the improvement in producers meeting processors grids A percentage of those involved in the discussion groups, forums and clients of Genetics Knowledge Project graduates will make changes to practices related to genetic management within their herd. These changes will be monitored by genetic benchmarking across years.

Desired outcome

Improve the compliance of slaughter cattle in southern Australian production systems. The genetic effect will be to increase the number of beef cows in southern Australia that are joined to genetically superior bulls.

Evaluation criteria

Evaluation would be designed as part of the overall project. The genetics component could be evaluated using techniques to evaluate KSA that will occur as part of the coordinated integration of genetics into the overall message.

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