AUSTRALIAN BEEF BREEDING INSIGHTS

Introduction

To inform policy and strategic direction, Angus Australia has undertaken a national survey of Australian beef cattle breeders.

Additionally, this body of work was conducted to meet deliverables outlined in the "Enhancing technology adoption across the Angus genetic improvement pipeline" project (P.PSH.1063), funded through the MLA Donor Company (MDC).

The objective of the survey was to develop a dataset from which a benchmark of producer attitudes and Angus penetrance could be established, with the view to repeat the survey in five years to gauge practice change.

It is commonly recognised that Angus genetics and associated genetic technologies (e.g. Estimated Breeding Values, genomics) have made a significant contribution to the wider beef industry in terms of lifting productivity through gene introgression and genetic gain for commercially relevant traits. However, there have been few wide scale studies that have been undertaken to understand this formally, particularly on a national and regional scale.

To provide this understanding, Angus Australia has facilitated this study by way of quantitative survey methodology via an independent market research group. The study quantifies the level of penetration of Angus and Angus influenced genetics throughout Australia, in addition to gauging beef producer's knowledge and attitudes towards the associated genetic technologies.
More specifically, the quantitative survey, conducted across May and June 2019, provides responses from 1000 beef producers across Australia. The findings will be used as a baseline level in which to measure practice change over a 5-year period to 2023, when a second quantitative survey will be undertaken using the same methodology.

This report focusses on insights from the first phase of surveying project.

Contents

Insights Summary

Demographics

Male (70%)

Over 45 years of age (79%)

More than 26 years of experience in cattle production (71%)

Family owned (93%)

Owner operator (93%)

Average property size 8,176 ha

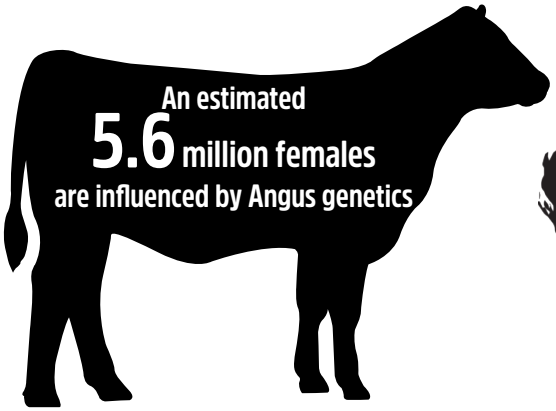
Willing to make considerable changes to the way they farm (45%)

On farm income predominantly derived from cattle (83%)

Targeting the feeder market (35%)

Main enterprise breeding (64%)

Average herd size 388 head

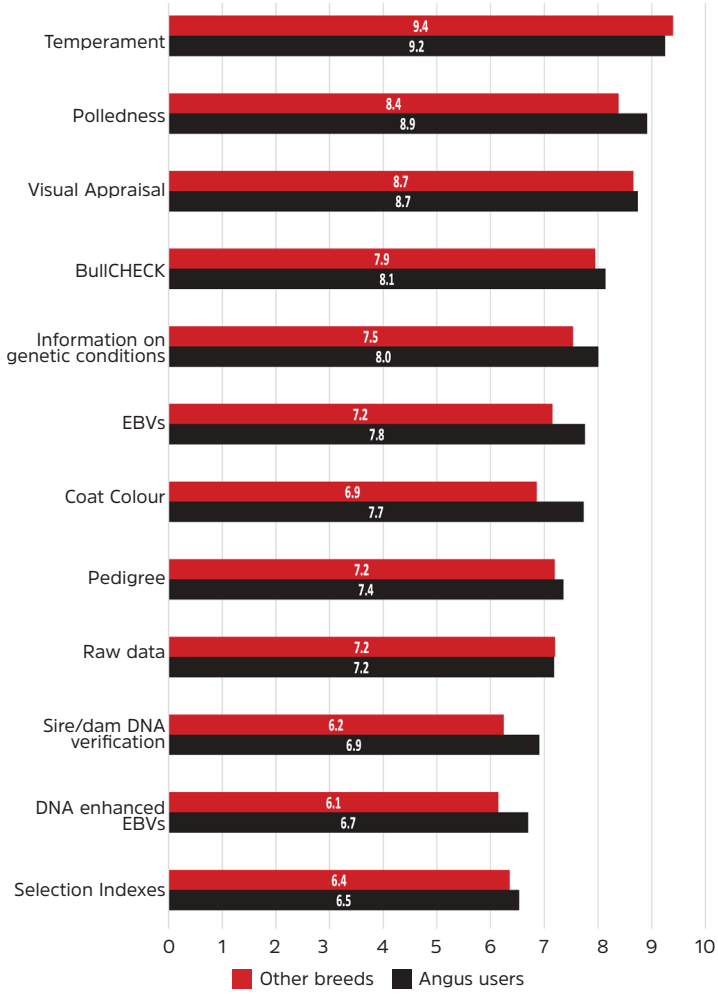


Angus is the **dominant breed** in the Australian cattle herd in both bull and female populations

An estimated **2.4 million females** are pure bred Angus, accounting for 20% of the national female herd

Bulls selected by producers were predominantly Angus (46%) and were mostly pure bred

How do producers rate bull selection criteria (1-10 scale)



Breeding Programs:

Most producers;

- Control period paddock join (67%)
- Self replace their breeding females (84%)
- Purchase bulls externally (83%)
- Straight breed (66%)

A higher percentage of producers cross breed and composite breed in Queensland and the Northern Territory, and to a smaller extent, Western Australia.

The vast majority of Angus users control period paddock join (85%) and/or use a fixed time artificial insemination program (27%).

Knowledge of genetics:

Those in NSW and Victoria rated their knowledge the highest of the states.

Angus Australia members have greater confidence in their knowledge of genetics than members of other societies and non-members.

Accessing Information:

Email and e-newsletter are the most widely used information source amongst participants.

Consultants and advisors were the most highly valued information sources.

Breed societies and bull breeders were ranked second and third most valued sources of information.

Methodology

Selection and Engagement of Chi Squared Agency

The agency Chi Squared was engaged after a considerable interview, quoting and shortlisting process. This involved gathering the names and contact information of market research companies from several agricultural service providers who have had experience with similar projects. These companies were approached for interviews and quotes, short listed and re-interviewed. Companies that had competitive pricing, experience in the agricultural sector, their own database of Australian producers and methodology that was aligned with the objectives of the project were viewed favorably, with Chi Squared ultimately being the preferred candidate.

Selection and Engagement of Chi Squared Agency

The survey was conducted over a 50 day period (11th May to 30th June 2019) and gathered 1,278 responses through four streams:

1. Chi Squared conducted telephone interviews with an Australian based call centre, consisting of retired producers and agricultural students
2. Crackerjack Farming database email correspondence
3. Angus Australia membership email correspondence
4. Angus Australia website and Facebook call for participants

An incentive to complete the survey, being a $2,500 donation to the Royal Flying Doctors Service, was made on the behalf of the respondents

Disqualifying Parameters

To ensure the survey captured responses that were representative of viable beef breeding enterprises across the wider beef industry there were disqualifying parameters put in place. These included:

- Herd size less than 20 head of breeding females
- Participant younger than 18 years of age
- Less than 3 years of experience
- Participant wasn't actively involved in the management decision making process of the operation
- Main enterprise did not involve breeding or trading
- Participant didn't intend to be still be breeding cattle in 5 years' time

This ultimately resulted in 1,023 suitable, unique responses.

Adjusted Data

In order to gain a more accurate measure of Angus influence and genetic composition, the significant over representation of Angus members was corrected. This was achieved by removing those respondents who were contacted through the Angus Australia membership streams and relied on the more randomized data collection of the Chi Squared and Crackerjack farming databases. These methods still captured a significant number of Angus Australia members, although the ratio to other breed societies (such as Herefords Australia) suggests that Angus Australia may be slightly underrepresented as a result. Although similar trends were observed, this process decreased the overall influence and genetic composition of Angus breed. Overall, 781 responses formed the 'adjusted' data on which the some of the findings in this report were based.

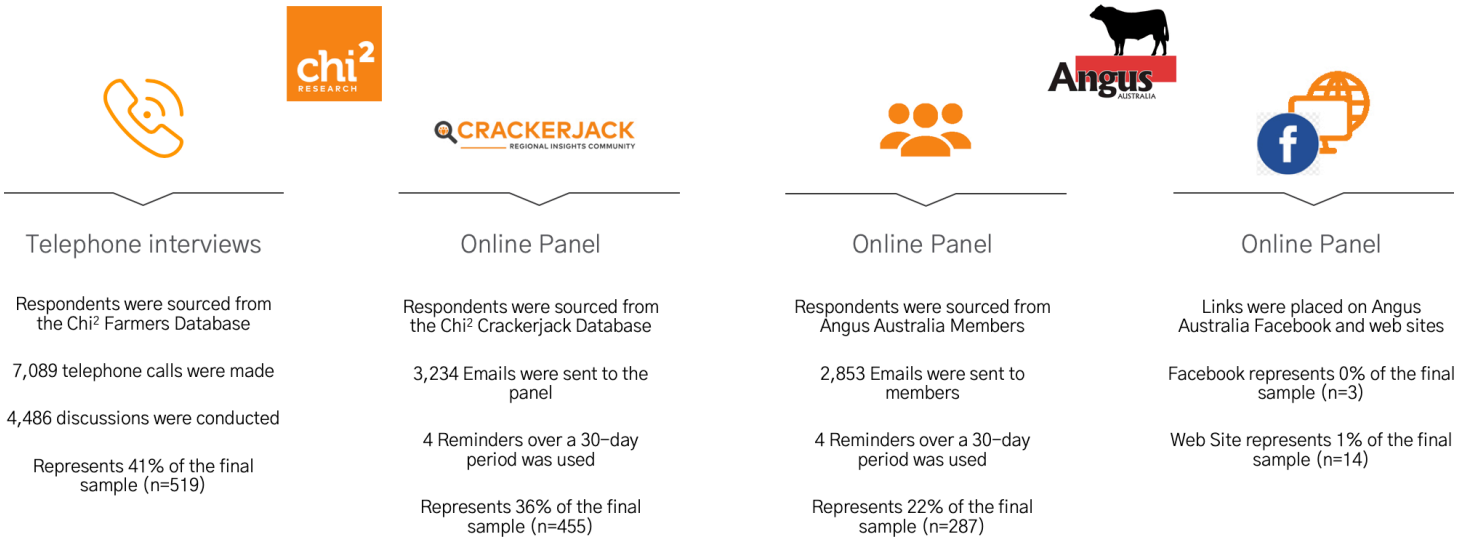


Figure 1: Breakdown of survey streams

TABLE 1: Unadjusted and adjusted breed society member numbers

State	Angus Australia	No Membership	Other Societies	Grand Total
New South Wales	129	146	35	310
Northern Territory	2	2	2	6
Queensland	66	130	53	249
South Australia	37	57	19	113
Tasmania	9	16	4	29
Victoria	115	60	25	200
Western Australia	29	73	14	116
GRAND TOTAL	387	484	152	1023

Adjusted				
New South Wales	47	137	35	219
Northern Territory	2	2	2	6
Queensland	48	130	53	231
South Australia	22	57	18	97
Tasmania	3	16	4	23
Victoria	32	55	23	110
Western Australia	12	69	14	95
GRAND TOTAL	166	466	149	781

Meaningful Sample Size and State Representation

Sample size was monitored, and effort was made to ensure that a representative number of responses were captured across each of the states. The below graph illustrates the representation of each state in the survey respondents compared to the number of Australian beef cattle businesses in each state, as most recently reported by the Australian Bureau of Statistics.

As illustrated in figure 2, due to the large membership base of Angus Australia in New South Wales and Victoria, the adjusted data sees an underrepresentation of respondents in those states while Queensland particularly saw an increase in proportional representation.

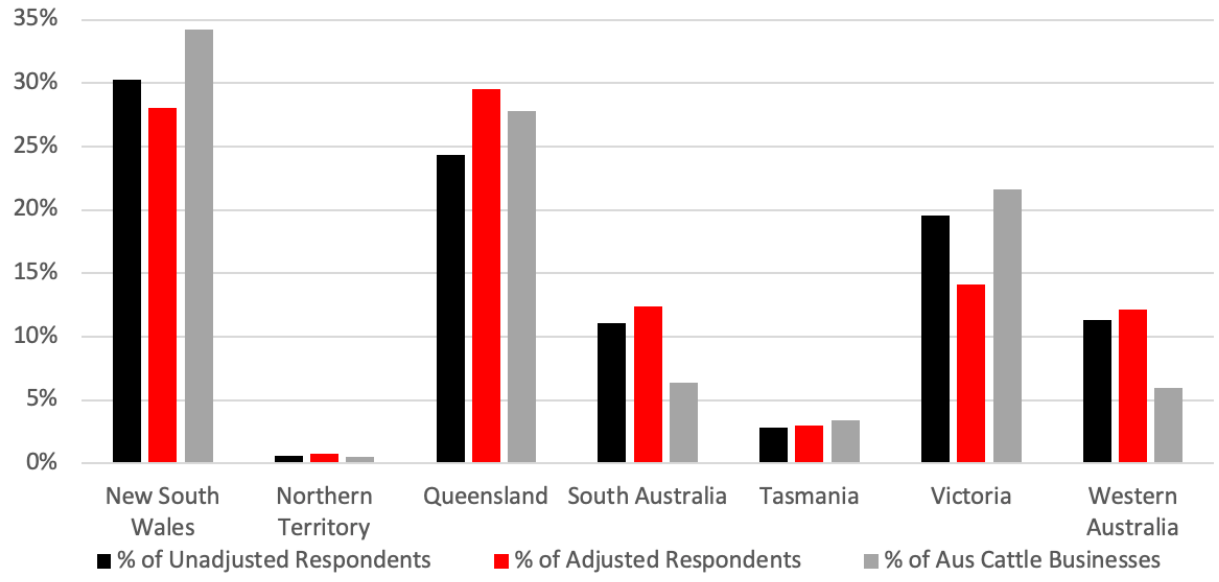


Figure 2: State survey representation compared to beef cattle business distribution

Demographics

KEY FINDINGS

Gender:	**Male (70%)**
Age:	**Over 45 years of age (79%)**
Experience:	**More than 26 years of experience in cattle production (71%)**
Attitude to change:	**Willing to make considerable changes to the way they farm (45%)**
Income Source:	**On farm income predominantly derived from cattle (83%)**
Ownership:	**Family owned (93%)**
Management:	**Owner/operator (93%)**
Enterprise:	**Breeding (64%)**
Target Market:	**Feeder market (35%)**

The People

Participants of the survey were typically male (70%) and over 45 years of age. Just 12% of respondents were less than 45 years of age, with 28% over 65 years, 29% between the ages of 55 and 65 years old and 22% falling in the 45-54 years old bracket.

Most respondents had completed Grade 12 or further study/training (71%), the most common or which was a tertiary education (26%). In contrast, 17% completed Grade 10/11 whereas 3% has finished schooling in Grade 9 or earlier.

As a result of the age of many producers, the length of farming experience was considerable. Most respondents listed more than 26 years of experience (63%) and 34% had 6-25 years of experience. When looking at direct cattle experience, the number of years of experience lengthened further, with 71% of producers listing more than 26 years of experience. A smaller proportion claimed 6-25 years of experience when compared to those in farming generally.

Respondent attitude to change and preparedness to implement change was predominantly progressive, with 45% stating that they are prepared to make significant changes to the way they farm while 36% agreed that they like to make minor changes to the way they farm. This was particularly evident in the Northern Territory, Queensland and New South Wales.

Their Business

Of the responses captured, the majority (83%) listed their primary income from farming activities came from beef cattle production, with 59% reporting that it was their sole source of farming income. Mixed farming operations reported that alternate income streams were mostly derived from sheep and grain production and are predominantly in Southern states.

The survey captured mostly owner/operators (93%), with just 5% being managers. Property ownership reflected this fact – 93% of properties were family owned. Family ownership extended for more than 50 years on 41% of respondent's properties, particularly in Victoria, South Australia, Tasmania and Western Australia, while 25%

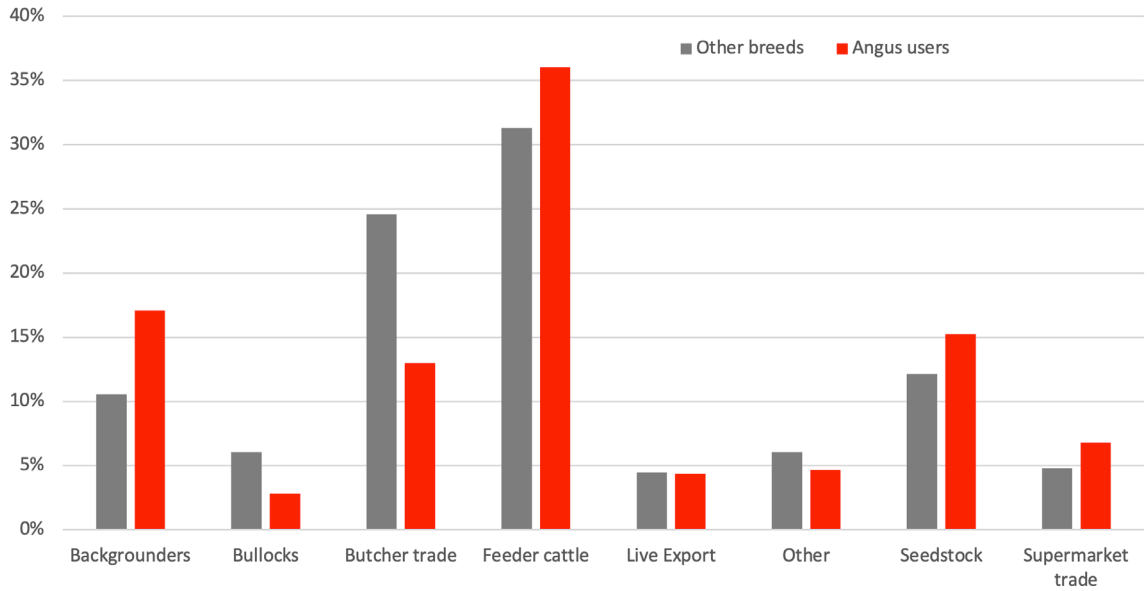


Figure 3: Markets targeted by Angus Users v Other Breed Users

had owned for 26-50 years and tenure for 6-25 years was reported by 30%.

Property area and female herd numbers illustrated the larger average female herd size and more expansive management areas in the northern states and territories, in line with ABAREs estimations. Among other factors such as mixed farming practices, the dry conditions prevalent at the time this survey was conducted and, given Australian cattle numbers are at historic lows, female herd numbers may have been depressed as a result.

As a result of the survey parameters (survey participants must have more than 20 head of breeding females), the majority of producers listed breeding as their primary operation (64%) while 28% stated that they ran both breeding and trading enterprises.

Conducting both breeding and trading was more common in South Australia, Queensland and particularly in the Northern Territory.

Target markets for the progeny of respondent's breeding herd differed according to the accessibility of markets. The feeder market was the predominant target market for all states (35%), excluding Tasmania and the Northern Territory – reflecting the lack of feedlot infrastructure and ease of accessibility to grain in those states.

The butcher trade and backgrounders were the second and third most popular target market identified by 17% and 15%, respectively. A further 14% of respondents listed that seedstock production was their primary target market. This finding may be a function of the sampling methodology (i.e. Angus Australia members surveyed). Live exporting was only listed by 4% of participants, predominantly in the Northern Territory.

Due to the nature of the survey sample and high numbers of Angus Australia members from commercial producers in the southern regions of Australia, 46% of participants were members of a breed society – 62% of which were Angus Australia members. Other breed societies respondents nominated were the Australian Hereford Society (6%) and the Australian Wagyu Association (3%).

Most respondents (71%) held one or more accreditations in industry programs – the most common of which were Meat Standards Australia accreditation (88%) and EU accreditation (25%).

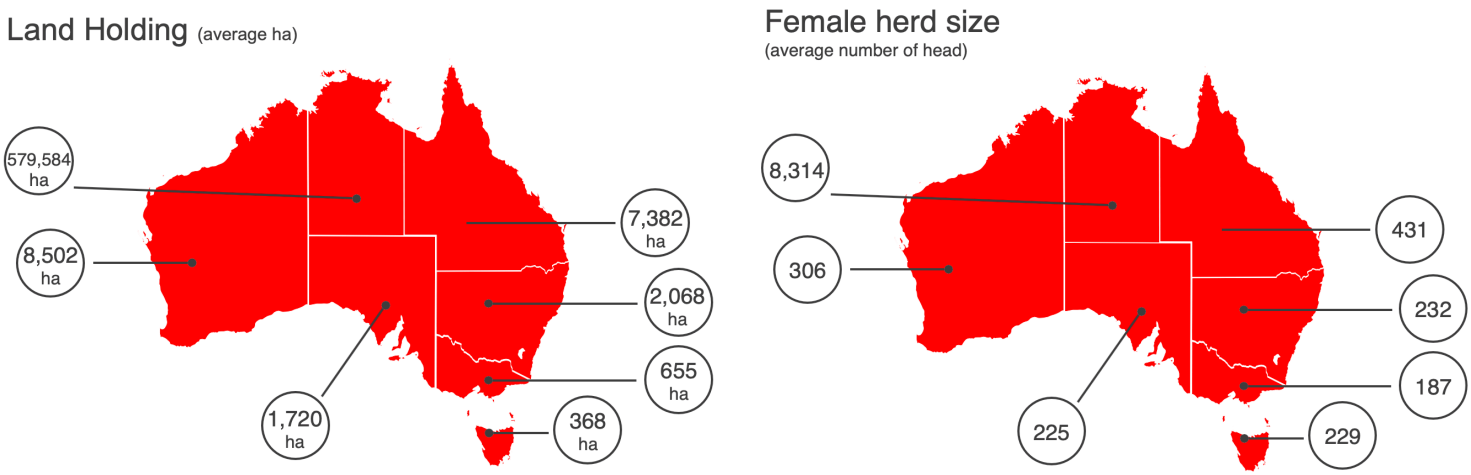


Figure 4: Average property size (LHS) and herd size (RHS)

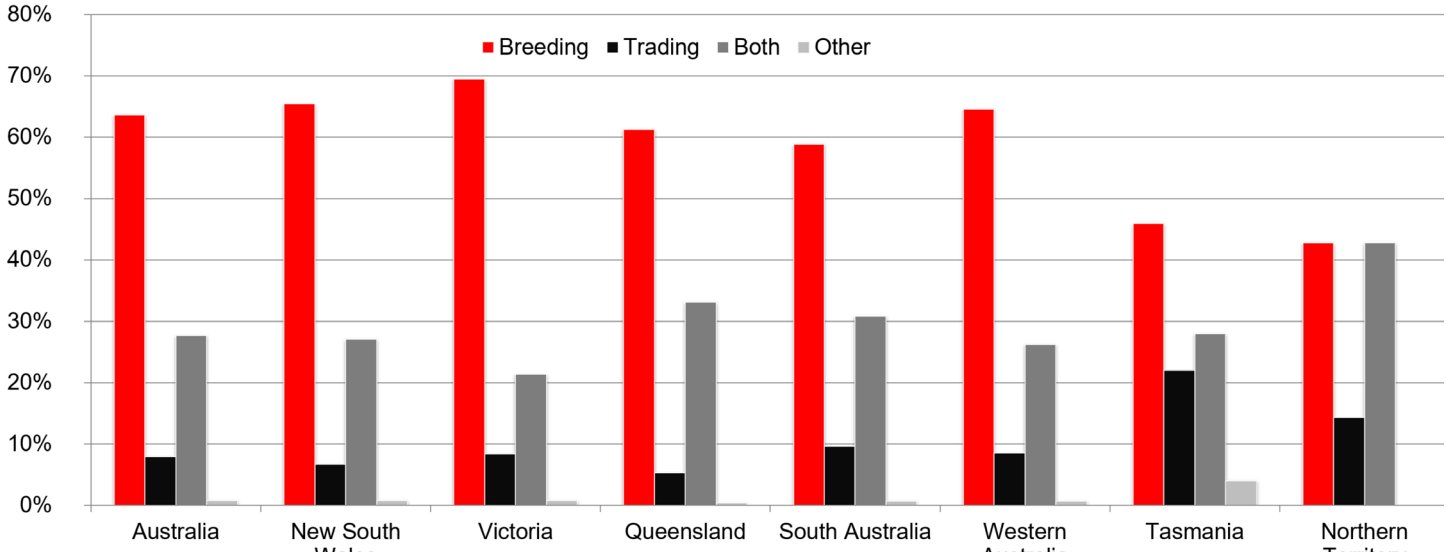


Figure 5: Beef cattle enterprise type by state

Breeding programs

KEY FINDINGS

Of the producers surveyed, most;

- **Self replace breeding females (84%)**
- **Purchase bulls externally (83%)**
- **Control period paddock join (67%)**
- **Have not changed their breeding system in more than 5 years (81%)**

Most respondents ran a pure bred breeding herd (64%)

66% of breeders straight breed

A higher percentage of producers cross breed and composite breed in Queensland and the Northern Territory, and to a smaller extent, Western Australia

The survey revealed that, of those involved in breeding, the vast majority self-replace their females (84%) while 13% purchase replacements and 3% source their females by self-replacing and purchasing. The remaining 1% nominated embryo transfer. This was reasonably proportionate across all states with New South Wales, Queensland, Western Australia and the Northern Territory being slightly more inclined to breed their own replacement females.

In terms of sourcing bulls, participants predominantly purchased their bulls externally (83%), demonstrating the vital role that seedstock producers play in the industry. Breeding their own bulls was also very common (35%) and identifies that some breeders rely on both purchased genetics and those they have bred. This proportion was reflected across all breeding systems except embryo transfer, where the majority of breeders opted to use their own bulls and were solely seedstock producers.

The breeding systems implemented across the survey sample was predominantly controlled period paddock joining (67%) while 17% year-round mated, 18% opted for fixed time artificial insemination, 9% nominated heat detection artificial insemination and 1% used embryo transfer.

Controlled Period Paddock Joining

Of the producers that nominated controlled period paddock joining as their breeding system, the majority listed ease, cost effectiveness and seasonal calving as the greatest drivers behind the decision to implement the program. This was reflected across all states expect the Northern Territory which put greatest value on seasonal calving. Other drivers (albeit to a lesser extent) included; improved bloodline, quality control, even line of calves, pressure on cows' fertility and back up after AI program. Those participants who recently changed to controlled period paddock joining primarily did so from year-round mating systems, the majority of whom were from the Northern Territory, Western Australia, South Australia and Queensland. These respondents listed set calving period and ease of management as the primary reasons behind the decision.

Controlled period paddock joining, which accounted for the majority of bull numbers, saw Angus nominated as the predominant breed of choice.

Year-Round Mating

Year-round mating was most common in northern states, particularly in the Northern Territory where it was the most widely used breeding system (71%) while in Queensland and South Australia it was the second most common system after controlled period paddock joining (32% and 16%, respectively). A notable proportion of respondents using year-round mating was also reported in New South Wales (14%) and Western Australia (13%). The vast majority of participant using year-round mating stated the ease and cost effectiveness was the main consideration for using this system (71%), while others believe it suited local conditions (27%). Roughly 25 participants claimed to have recently changed to year-round mating and are from all states except Tasmania. Most have changed from a restricted joining period and some have decreased/stopped using AI (mostly NSW, Vic and WA). These respondents listed the predominant driver behind this decision as making production and management easier.

The majority of bulls used in year-round joining programs were Charolais (34%), shortly followed by Angus (29%).

Fixed Time Artificial Insemination

Of the Australian cattle breeders surveyed, 18% stated that they use fixed time artificial insemination, with southern states much more likely to be using this method. In New South Wales, Victoria, Western Australia and Tasmania, fixed time AI was the second most popular breeding system, after controlled period paddock joining. The primary reason why this breeding system is used was to improve genetic bloodlines. Approximately 72 participants claim to have recently changed to adopt fixed time AI into their breeding

program, 22% of which changed from heat detection AI. Factors that influenced their decision included ease in production/management, to increase profitability, tighten calving period and improve quality of progeny. The higher proportion of fixed time AI users in southern states also reflects the higher percentage of breed society members (and therefore seedstock producers) in those states.

Heat Detection Artificial Insemination

Heat detection AI was found to be used in 9% of participants breeding programs across Australia, particularly in Victoria and Tasmania. Most who have implemented this breeding system have done so to improve genetic bloodlines. Of those who have changed to heat detection AI recently it is due to implementing an AI program or increasing the use of AI in their enterprise.

Attitudes and Management

The results of the survey illustrated that most participants had been practicing their preferred breeding system for more than five years, with 81% of respondents having not have made a change in the last five years, while 18% had. Year round joining had the most stable following and the least change to it in recent years. Meanwhile, fixed time artificial insemination had 31% of those implementing it adopt it in the last five years.

Cross and Straight Breeding

When it comes to joining, 66% of breeders straight breed, 31% cross breed and 8% breed composites. Across the states, there is a noticeably higher percentage of producers cross breeding and composite breeding in Queensland and the Northern Territory, and to a smaller extent, Western Australia.

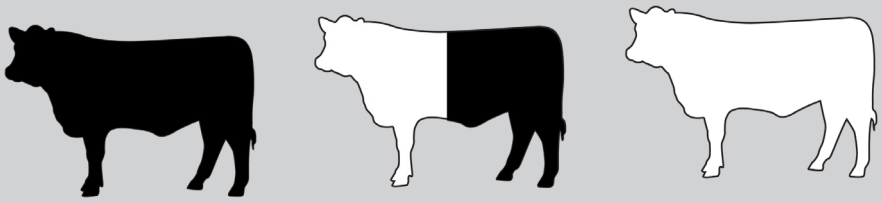
Angus Penetrance

Penetrance is described in this report in two ways;

Method One: **Breed Influence - The proportion of cattle that are influenced by Angus genetics. This ranges from pure Angus to those cross-bred with a reported percentage of Angus genetics. It is calculated on a per head basis.**

Method Two: **Genetic Composition - The proportion of the gene pool that is comprised of Angus genetics**

For example:



Method One: **66% of the above herd is influenced by Angus genetics (two from three head of cattle)**

Method Two: **50% of the herd's gene pool is Angus genetics**

KEY FINDINGS

Angus is the dominant breed in the Australian cattle herd in both bull and female populations

An estimated 5.6 million females influenced by Angus genetics accounting for 48% of the national female herd

An estimated 2.4 million females are pure bred Angus accounting for 20% of the national female herd.

Bulls selected by producers were predominantly Angus (46%) and were mostly pure bred.

One of the benchmarking baselines this survey aimed to establish is Angus penetrance. Gauging the use and influence of the Angus breed and genetics nationally assists with understanding the impact of initiatives undertaken at Angus Australia, and ultimately breeding animals selection decisions in Angus users herds flowing into the beef supply chain and to the consumer.

Breed Use

The unadjusted survey data identified that 63% of respondents ran a pure bred female herd nationally, while 28% stocked first crosses and 7% second crosses. Of those running pure bred herds, 66% nominated Angus as the breed and were predominantly southern state and Western Australian based. In fact, none of the Territorian respondents listed any Angus use, instead listing Brahman, Hereford and Santa Gertrudis. Pure Hereford herds made up 8% of participant's herds while Murray Grey herds made 5% and Brahman, 4%. Brangus herds were 1% of all pure bred herds.

Use of Angus females was primarily in pure bred herds (64%) however first cross and second cross females were common (26% and 7%, respectively). Of all producers running an Angus first cross female herd, 20% were crossed with Herefords, 10% with Brahman, 9% with Simmental and 7% with Santa Gertrudis.

In terms of bulls, 89% of respondents elect to use pure bred bulls – of which 57% were pure bred Angus bulls (unadjusted). Angus bulls made up the majority in all states, particularly Victoria (71%), New South Wales (65%) and South Australia (62%), while Queensland and Northern Territory recorded 34% and 33%, respectively.

Female Penetrance

Nationally, a total of 48% of females had some percentage of Angus breeding and 33% of the captured gene pool consisted of the breed. Angus was the most utilized breed in all states except Queensland and the Northern Territory. Influence and genetic composition of Angus was most significant in the southern states, most notable of which was South Australia, with Angus influencing 78% of the herd and genetic composition equating to 72%. New South Wales and Victoria recorded an influence and genetic composition of 78% and 65%, and, 77% and 57% respectively. SEE TABLE 2.

Bull Penetrance

Bull numbers were not collected in the survey therefore an assumption of 3% joining ratio was assumed and applied across all responses and influence and genetic composition was estimated for paddock joining systems (controlled period and year-round joining). The close alignment of influence and genetic composition further reflecting producer's preference for pure bred bulls, with unadjusted survey results indicating that 89% of respondents elect to use pure bred bulls.

On a national basis, Angus bulls accounted for close to half of bull numbers (46%) while genetic composition equated to 42%. Charolais influence was the second highest, accounting for 18% and a penetrance of 16%. Droughtmaster and Brahman rounded out the top four, with Droughtmaster accounting for 13% and 10%, and Brahman on 11% and 8% for influence and penetrance, respectively. SEE TABLE 3.

Extrapolation

The female beef cattle population figures for each state from the ABS Agricultural Commodities report for 2018-19 have been used to extrapolate the breed findings of this report. This resulted in an estimated population of 5.6 million head influenced by Angus genetics in Australia – with the largest populations of Angus females in Queensland (1.8 million head) and New South Wales (1.5 million head).

Nationally, an estimated 2.36 million females are pure bred Angus.

SEE TABLES 4 & 5.

Table 2: Breed influence and composition of females by state

National			New South Wales			Northern Territory			Queensland		
Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition
Angus	48%	33%	Angus	78%	65%	Hereford	86%	39%	Brahman	38%	22%
Hereford	28%	14%	Hereford	21%	14%	Charolais	67%	34%	Droughtmaster	34%	17%
Droughtmaster	23%	11%	Charolais	13%	2%	Angus	33%	12%	Angus	32%	18%
Charolais	22%	8%	Shorthorn	7%	2%	Droughtmaster	29%	8%	Santa Gertrudis	17%	10%
Brahman	17%	10%	Simmental	6%	1%	British X	3%	2%	Charolais	15%	3%
Santa Gertrudis	7%	5%	Ultra Black	6%	3%	Murray Grey	3%	1%	Hereford	9%	5%
Simmental	4%	1%	Brahman	4%	2%	Santa Gertrudis	3%	3%	Brangus	7%	5%
Shorthorn	4%	1%	Limousin	3%	1%	Brahman	0%	0%	Charbray	6%	3%
Murray Grey	3%	2%	Droughtmaster	2%	0%				Simmental	6%	1%
Brangus	3%	2%	Angus, Red	2%	1%				Belmont Red	4%	1%
Charbray	2%	1%	Murray Grey	2%	1%				Shorthorn	4%	1%
Belmont Red	2%	0%	Holstein	2%	2%				Bazadais	4%	3%

South Australia			Tasmania			Victoria			Western Australia		
Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition
Angus	78%	72%	Angus	53%	17%	Angus	77%	57%	Angus	40%	32%
Hereford	13%	8%	Angus X	35%	35%	Hereford	29%	18%	Droughtmaster	32%	28%
Speckle Park	9%	0%	Hereford x Shorthorn	32%	3%	Droughtmaster	10%	2%	Brahman	11%	11%
Murray Grey	6%	4%	Droughtmaster	31%	7%	Angus, Red	7%	3%	Murray Grey	9%	6%
Santa Gertrudis	5%	3%	Hereford	30%	11%	Friesian	5%	4%	Charolais	6%	3%
Shorthorn	5%	4%	Angus x Hereford	26%	7%	Shorthorn	5%	2%	Shorthorn	4%	2%
Simmental	4%	2%	Murray Grey	13%	8%	Simmental	4%	2%	Hereford	4%	4%
Charolais	3%	1%	Shorthorn	8%	6%	Angus x Hereford	3%	1%	Simmental, Black	4%	2%
Angus, Red	2%	1%	Angus x Murray Grey	7%	1%	Crossbreed	3%	0%	Friesian	4%	2%
Angus x Friesian	1%	1%	Angus x Friesian	5%	1%	Angus x Friesian	3%	0%	Simmenta	3%	1%
Angus x Hereford	1%	0%	Hereford x Friesian	5%	0%	Simmental x Gelbvieh	2%	1%	Angus, Red	2%	1%
Hereford X	1%	0%	Charolais	2%	2%	Charolais	2%	0%	Murray Grey x Charolais	2%	2%

Table 3: Breed influence and composition of bulls by state

National			New South Wales			Northern Territory			Queensland		
Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition
Angus	46%	42%	Angus	73%	63%	Charolais	67%	67%	Angus	36%	31%
Charolais	18%	16%	Hereford	16%	13%	Angus	33%	33%	Droughtmaster	28%	20%
Droughtmaster	13%	10%	Charolais	9%	5%	Murray Grey	3%	3%	Brahman	25%	19%
Brahman	11%	8%	Ultra Black	6%	3%	Murray Grey x Belgian Blue	3%	1%	Santa Gertrudis	11%	9%
Hereford	9%	6%	Simmental	5%	2%	Santa Gertrudis	3%	3%	Hereford	8%	3%
Santa Gertrudis	5%	4%	Other	4%	1%	Brahman	0%	0%	Charolais	6%	3%
Angus, Red	4%	1%	Wagyu	3%	1%				Bos Indicus	6%	3%
Simmental	2%	1%	Brahman	2%	1%				Bos Taurus	6%	3%
Bos Indicus	2%	1%	Shorthorn	2%	2%				Brangus	5%	4%
Bos Taurus	2%	1%	Limousin	1%	1%				Charbray	5%	2%
Wagyu	2%	1%	Angus, Red	1%	1%				Wagyu	4%	2%
Brangus	2%	1%	Speckle Park	1%	1%				Braford	4%	3%

South Australia			Tasmania			Victoria			Western Australia		
Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition	Breed	Influence	Composition
Angus	75%	72%	Angus	50%	48%	Angus	65%	61%	Angus	29%	28%
Hereford	11%	7%	Hereford	31%	27%	Hereford	23%	19%	Droughtmaster	28%	27%
Speckle Park	9%	1%	Angus, Red	29%	3%	Angus, Red	6%	4%	Angus, Red	22%	2%
Santa Gertrudis	6%	5%	Murray Grey	10%	10%	Simmental, Black	5%	4%	Brahman	11%	11%
Shorthorn	4%	4%	Shorthorn	8%	8%	Limousin	3%	2%	Murray Grey	8%	6%
Simmental	3%	2%	Charolais	4%	3%	Charolais	2%	2%	Charolais	6%	5%
Limousin	3%	3%	Holstein	1%	1%	Simmental x Gelbvieh	2%	1%	Simmental	4%	4%
Brahman	3%	0%	Limousin	0%	0%	Blonde d-Aquitaine	1%	1%	Simmental, Black	4%	4%
Angus, Red	2%	1%				Murray Grey	1%	1%	Hereford	4%	4%
Murray Grey	2%	2%				Shorthorn	1%	1%	Senepol	2%	0%
Charolais	2%	1%				Wagyu	1%	1%	Limousin	1%	1%
Simmental, Red	1%	0%				Brangus	0%	0%	Shorthorn	1%	1%

Table 4: Estimated actual breed populations

National		New South Wales		Northern Territory		Queensland	
Breed	No. of head	Breed	No.head of	Breed	No.head of	Breed	No. of head
Angus	5606199	Angus	1461977	Hereford	1182899	Brahman	2186484
Hereford	3248472	Hereford	399812	Charolais	922661	Droughtmaster	1955813
Droughtmaster	2697024	Charolais	243634	Angus	449502	Angus	1824097
Charolais	2535953	Shorthorn	139244	Droughtmaster	402186	Santa Gertrudis	954099
Brahman	2019471	Simmental	113825	British X	47316	Charolais	885265
Santa Gertrudis	857359	Ultra Black	105621	Murray Grey	47316	Hereford	543684
Simmental	481939	Brahman	76963	Santa Gertrudis	47316	Brangus	385884
Shorthorn	477428	Limousin	60204	Brahman	4732	Charbray	358661
Murray Grey	314855	Droughtmaster	45805			Simmental	344790
Brangus	294769	Angus, Red	36615			Belmont Red	253598
Charbray	282586	Murray Grey	34679			Shorthorn	231085
Belmont Red	192413	Holstein	28166			Bazadais	217370

South Australia		Tasmania		Victoria		Western Australia	
Breed	No. of head	Breed	No.head of	Breed	No.head of	Breed	No. of head
Angus	331002	Angus	104382	Angus	768429	Angus	425927
Hereford	53970	Angus X	69956	Hereford	286559	Droughtmaster	339241
Speckle Park	40246	Hereford x Shorthorn	62592	Droughtmaster	99411	Brahman	113464
Murray Grey	24248	Droughtmaster	61488	Angus, Redw	65781	Murray Grey	92203
Santa Gertrudis	20727	Hereford	60015	Friesian	54147	Charolais	59525
Shorthorn	19318	Angus x Hereford	51547	Shorthorn	52878	Shorthorn	46817
Simmental	18050	Murray Grey	25000	Simmental	38072	Hereford	45909
Charolais	11068	Shorthorn	15206	Angus x Hereford	27877	Simmental, Black	44513
Angus, Red	7486	Angus x Murray Grey	13991	Crossbreed	27497	Friesian	38752
Angus x Friesian	4025	Angus x Friesian	9941	Angus x Friesian	26397	Simmental	28244
Angus x Hereford	3924	Hereford x Fresian	9941	Simmental x Gelbvieh	16921	Angus, Red	26114
Hereford X	3682	Charolais	4418	Charolais	16075	Murray Grey x Charolais	20947

Table 5: Extrapolated pure bred and cross Angus females

		Percentage Angus				
	Breed	100%	75-99%	50-74%	25-49%	0-24%
Angus	Angus	2361197	629786	1063111	1033966	518139
	Angus, Red	1349	18505	85855	25367	19276
Angus Crosses	Angus X			78106	964	2313
	Angus x Charolais			6168		1928
	Angus x Devon				1928	
	Angus x Droughtmaster					19083
	Angus x Friesian			16963	925	34697
	Angus x Hereford				17156	90520
	Angus x Jersey					1157
	Angus x Limousin				1928	
	Angus x Murray Grey				5783	
	Angus x Santa Gertrudis			3855		2315
	Angus x Shorthorn					1928
	Angus x Simmental					8404
	Angus, Red x Droughtmaster					3855
Established Angus Influenced Breeds and Their Crosses	Brangus			110876	78646	105247
	Brangus, Red					12337
	Brangus x Braford					23131
	Brangus x Charbray					4241
	Lowline	1542				
	Murray Grey			104977	65114	144763
	Murray Grey X					964
	Murray Grey x Brahman					3084
	Murray Grey x Charolais				23131	
	Murray Grey x Droughtmaster					3855
	Murray Grey x Friesian					3778
	Murray Grey x Hereford					3855
	Square Meater				6361	
	Stabilizer					6939
	Ultra Black				119897	
	Grand Total	2364088	648291	1469912	1381165	1047806

Attitudes to Genetic Information

KEY FINDINGS

Those in NSW and Victoria rated their knowledge of genetics the highest of the states.

Angus members have greater confidence in their knowledge of genetics than members of other societies and non-members. Angus users also rated their knowledge of genetics more highly than their other breed counterparts.

Nationally, temperament was the most highly sought-after trait when selecting a bull, shortly followed by polledness and BullCHECK.

Angus members valued all selection criteria more highly than other society members and non-members. Selection indexes were the lowest priority of Angus members, non-members, other society members, Angus users and other breed users.

Knowledge of Genetics

How participants rated their personal knowledge of genetics varied state to state. Those in Victoria averaged the highest (7.3), with more than 55% rating themselves more than an eight (1 being poor, 10 being excellent). New South Wales averaged the second highest on 7.2, with more than 51% rating themselves an eight or higher. In contrast, Tasmania, Queensland and South Australia averaged a rating of 6.8, 6.9 and 6.9 respectively – with 42% in Tasmania, 47% in Queensland and 49% in South Australia rating themselves an eight or higher.

When asked to rate their knowledge of genetics, 67% of Angus Australia members rated their knowledge to be an eight of higher – slightly higher than members of other societies (57%) and significantly higher than non-members (34%).

The survey data was adjusted to remove the Angus membership effect and participants were identified as Angus users and other breed users, the difference was less pronounced – with 49% of Angus users rating themselves an eight or higher compared to the 40% of other breed users.

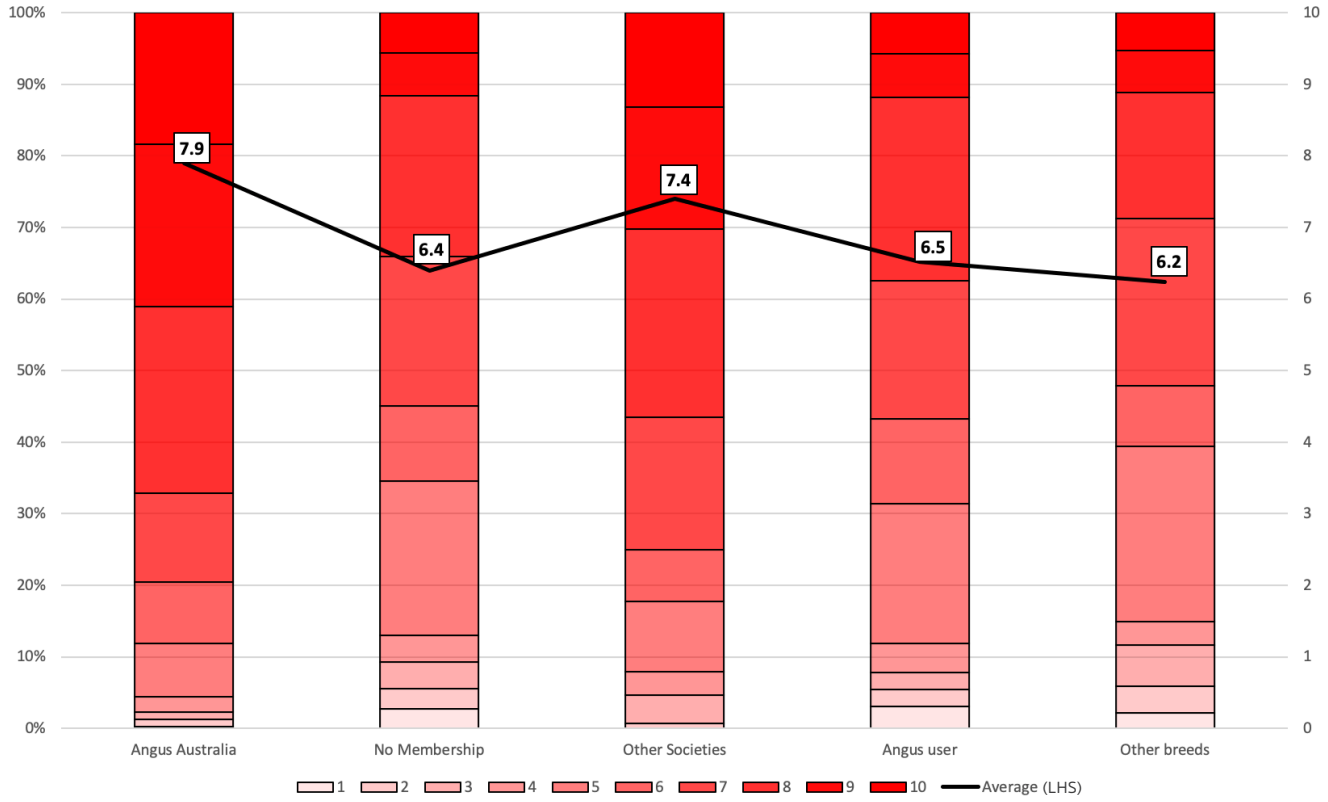


Figure 6: Knowledge of genetics rating by breed society and breed use. Note: Angus users and Other breeds figures exclude all breed society members.

Bull Selection Criteria

Participants were asked to rate the importance of bull selection criteria. On a national level, temperament was listed as the most important factor and this was consistent across all states except South Australia which prioritised polledness and Northern Territory which valued BullCHECK, and listed temperament second. In descending order, the survey listed the national ranking of importance as; temperament, polledness, visual appraisal, BullCHECK, information on genetic conditions, EBVs, coat colour, pedigree, raw data, sire/dam DNA verification, DNA enhanced EBVs and selection indexes.

There were some notable differences between states reflecting the difference between past experiences and education, production systems and climate. For example, producers in Tasmania and to some extent Victoria rated BullCHECK the lowest of the states, while those in the Northern Territory listed it as the most important selection criteria. Victoria was the most concerned state when it came to providing information on genetic conditions.

Queensland and the Northern Territory rated EBVs, sire/dam DNA identification and pedigree the lowest of the states, perhaps reflecting the lesser degree of exposure to seedstock production, and classed coat colour of the least concern compared to other states.

On the other hand, Victoria and Tasmania put the greatest value of the states on sire/dam DNA identification and pedigree. Also of note was the Northern Territory's considerable priority put on confirmation and structure, DNA enhanced EBV's and selection indexes compared to that of other states.

The bull selection criteria preferences of Angus members were slightly different to that of the national priorities, with Angus Australia members listing the following in descending order of importance; temperament, visual appraisal, polledness, information on genetic conditions, BullCHECK, coat colour, EBVs, pedigree, sire/dam DNA verification DNA enhanced EBVs, raw data and selection indexes. Of note was the higher value put on all criteria (excluding temperament and raw data) and the greater importance placed on coat colour than their non-member and other breed society member counterparts.

Table 6: Average rating of bull selection criteria by state (unadjusted)

Selection Criteria	National	New South Wales	Northern Territory	Queensland	South Australia	Tasmania	Victoria	Western Australia
Temperament	**9.3**	**9.3**	9.0	**9.3**	**9.3**	**9.7**	**9.3**	**9.3**
Polledness	8.7	8.5	8.8	8.5	**9.3**	9.4	9.0	8.9
Visual Appraisal	8.7	8.7	8.0	8.6	8.7	8.7	8.9	8.7
BullCHECK	8.1	8.1	**9.3**	8.4	8.0	7.2	7.8	8.3
Information on genetic conditions	7.9	7.9	7.5	7.7	7.9	7.9	8.0	8.0
EBVs	7.6	7.7	8.7	7.1	7.6	7.1	7.7	8.0
Coat Colour	7.5	7.7	5.7	7.1	7.7	6.9	7.8	7.1
Pedigree	7.3	7.4	6.0	7.1	7.2	7.5	7.5	7.5
Raw data	7.2	7.1	8.0	7.4	7.4	7.2	7.2	7.0
Sire/Dam DNA Verification	6.7	6.8	6.2	6.4	6.5	6.8	7.0	6.8
DNA enhanced EBVs	6.5	6.6	8.0	6.3	6.3	6.2	6.8	6.7
Selection Indexes	6.5	6.5	7.8	6.3	6.6	5.8	6.4	7.0

Table 7: Bull selection criteria by membership and breed use.
Note: Angus users and Other breeds exclude all breed society members.

Trait	Angus Australia Member	No Membership	Other Societies Member	Angus users	Other breeds
Temperament	9.3	9.3	9.4	9.2	9.3
Visual Appraisal	8.9	8.5	8.8	8.5	8.5
Polledness	8.9	8.9	8.1	9.0	8.6
Information on genetic conditions	8.5	7.3	8.1	7.4	7.2
BullCHECK	8.3	7.8	8.3	7.9	7.8
Coat Colour	8.1	7.1	7.1	7.4	6.6
EBVs	7.9	7.4	7.4	7.5	7.1
Pedigree	7.8	6.8	7.6	6.8	6.8
Sire/Dam DNA Verification	7.7	5.8	7.1	5.9	5.7
DNA enhanced EBVs	7.2	5.9	6.7	6.0	5.9
Raw data	7.2	7.1	7.5	7.1	7.0
Selection Indexes	6.6	6.3	6.5	6.4	6.3

Understanding How Producers Access Information

KEY FINDINGS

Email and e-newsletter the most widely used information source amongst participants

Consultants and advisors were the most highly valued information sources

Breed societies and bull breeders were ranked second and third most valued source

Facebook was the most utilised social media platform

There has been a slow albeit steady trend away from traditional media sources in regional Australia. Understanding how producers access, receive and disseminate information is critical to any program's ongoing success.

The information collected revealed that, in terms of volume, email and e-newsletter were the most widely utilized medium in which to receive information, shortly followed by newspapers and other farmers/neighbours. Arising from the high number of participants involved with Breed Societies, 47% nominated bull breeders and 45% listed breed societies as sources they rely on for information.

Other highly utilized sources of information included printed newsletters, magazines, radio, consultants (includes agents, processors, vets) and supplies of farm products. Social media was one of the lowest used sources (20%), perhaps reflecting the age demographics of the survey participants.

When participants rated each medium, consultants and advisors were the most highly valued source of information. Breed society and bull breeders were rated second and third, respectively, and emails/e-newsletters were the fourth most valued information source. Other sources that producers valued highly included other farmers/neighbours, newspapers and magazines.

Social media use was predominantly Facebook based, accounting for 81% for social media users, while YouTube accounted for 38% and Instagram for 20%. Interestingly, social media use across all mediums were higher in the Northern Territory. Facebook use was noticeably higher in the Northern Territory (100%) and Queensland (90%) compared to other states, and to a lesser extent New South Wales (83%) and Western Australia (82%).

Appendix One: Terms of Reference

Angus Australia - Stakeholder Survey
Terms of Reference

1. Background

Angus Australia is a not-for-profit, member-based organisation with a mission to enhance and promote the value of Angus in Australia. Established in 1919, Angus Australia has grown to be the largest beef cattle breed association in Australia with a total membership of approx. 3,500 (including seedstock, commercial and youth members from all states).

Services provided by Angus Australia include the pedigree and performance recording of Angus and Angus influenced cattle, the provision of industry leading genetic evaluation and DNA services to assist members make informed breeding decisions; the conduct of applied R&D and information technology programs to benefit members and the broader beef industry; the conduct of comprehensive education, extension and youth development programs to enhance the knowledge and skills of members; and, the conduct of supply chain quality assurance to protect and enhance the integrity of the Angus brand.

Angus Australia maintains a comprehensive database containing pedigree, performance and DNA information on over 2 million animals, with approx. 110,000 registered females currently listed on the active female inventory. Conservative estimates indicate that at least 50% of commercial breeding females in the temperate Australian beef industry are joined to Angus sires, with an increasing number of breeding programs in Northern Australia utilising Angus genetics.

2. Objectives

Meat and Livestock Australia, through its Donor Company program (MDC) has provided funding assistance to Angus Australia to conduct a project to enhance technology adoption across the Angus genetic improvement pipeline. This five (5) year project commenced in April 2018. The project has several objectives, including the engagement of an independent body to conduct repeated quantitative surveys to provide a measure of the impact of education and extension investments on the adoption of technology by stakeholders across the beef value chain.

An initial survey (Year 1), to be conducted by the end of April 2019, will be designed to gauge the baseline level of skills, knowledge and attitudes impacting technology adoption, and to determine the penetration of Angus and Angus influenced cattle in both southern (temperate) and northern Australia; and, the second survey (Year 5) to be conducted by April 2023, will be designed to gauge the extent of change over the 5-year period of the project.

3. Survey methodology

The methodology to be used, including the sampling strategy and content will be determined at the pre-survey workshop with Angus Australia staff.

The survey is intended to target seedstock and commercial beef cattle producers in both northern and southern Australia.

Indicative information sought from the survey includes the following:

- demographic data on respondents including location, types and size of beef enterprises, age bracket of breeder, primary target markets
- underlying perceptions or biases relating to the use of Angus and Angus influenced cattle (i.e. what influences producers to use, or not to use, Angus or Angus influenced cattle)
- reasons why producers would not consider using Angus or Angus influenced genetics
- the economic benefit of using Angus or Angus influenced genetics
- the use and perception of services offered by Angus Australia (what does the organisation do well, what needs improvement)
- the extent of use of genetic and reproductive technologies in seedstock and commercial herds,
- opinions on opportunities and threats for Angus Australia and the wider Australian beef cattle industry over the next decade.

4. Reporting requirements

A final report for the first survey must be provided to Angus Australia no later than 30th April 2019, with an interim report to be provided by 28th February 2019.

A final report for the second survey must be provided to Angus Australia no later than the 28th February 2022, with an interim report to be provided by 31st December 2021.

5. Tender process

Tenders to conduct the survey are invited from independent industry recognised bodies with capacity to fulfil the objectives and time frames noted above. Previous experience in a similar survey for the beef industry will be highly regarded.

- The successful tender will be selected against several criteria including:
- A demonstrated understanding of the Australian beef cattle industry
- Provision of a detailed quote with a breakdown in expenditure,
- Capacity to meet with Angus Australia and facilitate a pre-survey workshop for more detailed discussions on survey objectives, methodology and reporting,
- Provision of an indicative work plan detailing action items, timeline and responsibilities,
- Commitment given to the 5-year contractual term.

For more information visit

www.angusaustralia.com.au

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