

A SURVEY APPROACH TO EXPLORE INDUSTRY PRIORITIES FOR NOVEL TRAITS IN AUSTRALIAN ANGUS

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SUMMARY

This study used a survey approach to investigate preferences in the Australian Angus industry for novel traits (immune competence, structural soundness, feed efficiency and temperament) over classical production traits. One hundred and thirty five people responded and ranked 11 attributes. The pool of respondents represented a cross section of the industry. Preferences were high for novel traits, with the exception of feed efficiency. Calving and reproduction traits had the lowest preference, possibly indicating satisfaction with current performance for these traits. Rankings of attributes were the same when responses were split by demographic information. Although differences in attribute rankings were observed, the interpretation of the results is limited to the respondents of the survey.

INTRODUCTION

Beef cattle breeding programs have focussed on production and reproduction traits, the primary profit drivers for the industry (Angus Australia 2014). Novel traits such as structural soundness, temperament and immune competence offer the opportunity to maintain a healthy, sustainable and productive herd into the future (Angus Australia 2017a, b; Angus Media 2017). However, when a novel trait is introduced into an existing breeding program, selection emphasis on current breeding objective traits is reduced. Every industry participant will value these trade-offs differently, depending on production environments, target markets and their own individual challenges and goals for their herd. Survey approaches are useful to explore these differences and *1000Minds* (Hansen and Ombler 2009) has previously been used to evaluate plant and sheep breeding programs (Smith and Fennessy 2011; Byrne *et al.* 2012). The aim of this study is to explore preferences in the Australian Angus industry for novel traits in breeding programs using a *1000Minds* survey (Hansen and Ombler 2009).

MATERIALS AND METHODS

Survey design. The *1000Minds* software was used to implement a choice experiment survey. The software generates “part-worth utilities” which describe the relative importance that participants place on a number of attributes (Hansen and Ombler 2009). The attributes were based on the traits included in the current Australian Angus Selection Indexes (Angus Australia 2014) plus a number of novel traits, including feed efficiency, structural soundness and immune competence, which is the ability of the immune system to respond to a disease challenge (Colditz and Hine 2016). Two or three levels of possible response were specified for each attribute and these were entered into the software in their logical ranking (Table 1).

Participants responded to a number of questions where they chose between two hypothetical scenarios with differing levels of response in pairs of attributes. An example of a question was “Do you prefer Option A (-20kg change in Carcase weight and +2% change in Saleable meat yield) or Option B (+20kg change in Carcase weight and no change in Saleable meat yield)?” and this is illustrated in Figure 1. Participants also had the opportunity to rate the options as equally appealing or rate a combination as impossible. The *1000Minds* software applies the PAPRIKA method that automatically drops impossible choice combinations based on the previously expressed preferences (Hansen and

Ombler, 2009). The method calculates the part-worth utilities based on individual survey responses.

A Wufoo multiple choice survey (Hale *et al.* 2006) was used to collect demographic information. Questions included participant’s role in the industry (e.g. breeder, producer), their location, the average number of females in their breeding herd, which production environment (temperate or subtropical) and which production system (grain or grass fed) they were targeting.

Table 1. Attributes included in the survey

Attribute	Level 1	Level 2	Level 3
Immune competence	More expected disease incidence	Less expected disease incidence	
Calving ease	No change	5% fewer calving difficulties	
Marbling score	-1	+1	
Docility	10% less docile	10% more docile	
Mature cow weight	+30kg	No change	-30kg
Sale live weight	-10kg	+10kg	
Carcase weight	-20kg	+20kg	
Saleable meat	No change	+1%	+2%
Structural soundness	10% less structurally sound	10% more structurally sound	
Weaning rate	No change	5% more calves weaned	
Feed efficiency	No change	5% improvement	

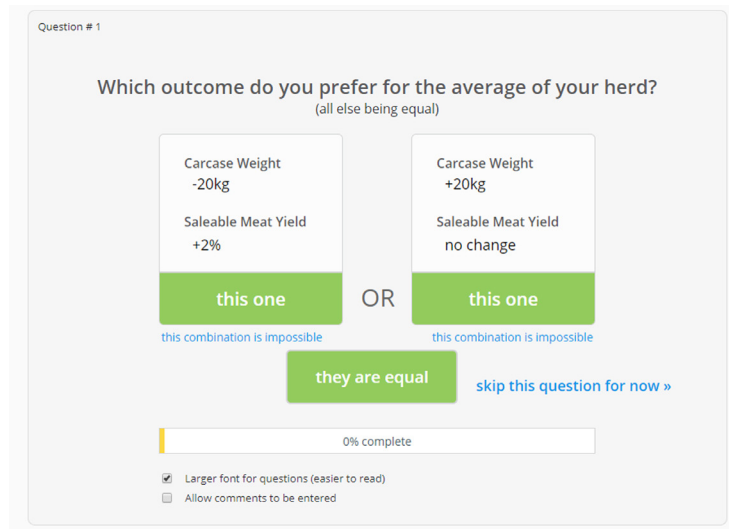


Figure 1. Example of a survey question to determine part-worth utilities

Survey participants. The survey was sent out through Angus Australia to their members, which included around 4,500 breeders and producers, as well as via various rural media publications. Participation was voluntary and this study was approved by the CSIRO Human Ethics Committee (Approval number 145/18).

RESULTS AND DISCUSSION

A total of 135 respondents (Table 2) completed the survey and represent a cross-section of commercial producers, seed stock producers and service providers (e.g. consultants), with distribution across

production environments. For analysis purposes of this paper four respondents who identified their location as ‘Other’ were removed from the dataset. The relatively low response rate may potentially have been due to survey fatigue or to the unfamiliar format of the survey where participants were tasked with choosing between scenarios that may not reflect their personal operation, but the choice provides an informative utility value. The survey was promoted through Angus Australia as a call for members to have their say on traits in current indexes, but more information regarding the survey format and its potential application might have been beneficial in the lead up to the survey period. In addition, this survey technique has previously been used with smaller numbers of focus groups, for example Byrne *et al.* 2012 surveyed 24 sheep industry experts and 25 sheep farmers in Ireland and in comparison the number of respondents in this survey was significantly larger.

Table 2. Role and location of respondents

Role/Location	NSW	VIC/TAS	SA	QLD	WA	Other	Total
Commercial cow-calf producer	10	24	4	1	3	0	42
Seedstock and commercial cow-calf producer	17	9	1	3	5	1	36
Seedstock producer	29	16	1	4	3	2	55
Service provider (eg consultant)	0	1	0	0	0	1	2
Total	56	50	6	8	11	4	135

The total sum of all part-worth utilities always sums to 100%. If all 11 attributes would be ranked the same, they would all have a mean part-worth utility of 9.10%, but as a result of the survey mean part-worth utilities across all traits ranged from 6.50% – 11.86% (Table 3). Three of the four novel traits, with the exception being feed efficiency, had the highest part-worth utilities with values above 10%. For weight and carcass traits, with the exception of mature cow weight, values ranged between 8.40% and 9.50%. The calving and reproduction traits, feed efficiency and mature cow weight ranged between 6.50%-8.07%. The observable difference in preferences for attributes depend on the number of attributes and also their importance to the survey participants (e.g. if all attributes are somewhat important, the observable differences are smaller). Rankings for the attributes across the demographics captured were the same (results not shown). These results indicate that the preferences observed applied regardless of the demographics.

The part-worth utilities demonstrate that amongst the respondents novel traits are desirable characteristics to improve in their herd. Relatively lower part-worth utilities indicate that participants placed lowest emphasis on calving and reproductive traits, possibly indicating that participants are comfortable with current performance for these attributes. The part-worth utility for mature cow weight was 7.16%, but choices for this attribute showed the highest variation, reflecting the trait being a rich topic of industry discussion. Feed efficiency was ranked lowest of the novel traits.

It is interesting to note that immune competence, a trait which is not currently routinely measured, and which is arguably most relevant to the feedlot phase of the animals was ranked more highly than feed efficiency, and by respondents from all sectors of the industry. The more favourable response to the immune competence choice could reflect a desire to make progress towards addressing currently intractable industry issues such as the incidence of bovine respiratory disease in feedlots. On the other hand, the description of the alternate immune competence scenarios (more/less disease incidence) may have played a role, for example when compared with the description of the feed efficiency choice (feed efficiency no change/5 % improvement).

Table 3. Mean, Standard deviation (StdDev), Minimum (Min) and Maximum (Max) part-worth utility values across all participants

Attribute	Mean Part-worth utility value (%)	StdDev	Min	Max
Structural soundness	11.86	3.07	1.02	22.34
Immune competence	10.84	3.03	3.13	18.64
Docility	10.62	3.58	0.81	19.49
Carcase weight	9.53	3.29	1.82	16.22
Marbling score	9.10	4.03	0.80	21.43
Sale live weight	9.00	3.65	0.78	20.41
Saleable meat yield	8.93	3.28	1.75	21.28
Weaning rate	8.39	3.85	0.85	17.17
Feed efficiency	8.07	3.48	0.96	15.60
Cow weight	7.16	5.61	1.71	25.00
Calving ease	6.50	3.93	0.79	14.04

For future studies it may be interesting to capture participant's motivation for the preferences they expressed. For example, was their motivation purely economic in nature, or were there other motivations such as animal welfare concerns, animal management improvements or other strong reasons to desire change. This information could be captured along with the demographic information in a complimentary survey attached to the preference survey.

CONCLUSION

Choice experiment surveys are a useful tool to explore industry preferences. The interpretation of the result is limited to the pool of respondents and the more people respond, the more representative the results are of the wider industry. The results suggest there is interest in potentially exploring novel traits such as immune competence and their application in the Australian Angus industry, while there is a level of satisfaction with other traits such as the more traditional classical production traits such as carcase weight.

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