

Selecting Animals with Angus Selection Indexes



Selection indexes are utilised by livestock breeders of many species around the world and are considered an essential part of any modern livestock breeding program.

Selection indexes aid in the selection of animals for use within a breeding program where there are several traits of economic or functional importance by providing an overall “score” of an animal’s genetic value. Selection indexes are calculated for a specific breeding purpose and are calculated based on weightings placed on individual traits that are deemed to be important for that purpose.

Selection indexes assist beef producers in making “balanced” selection decisions, taking into account the relevant growth, carcass & fertility attributes of each animal to identify animals that are most suitable for use within their particular commercial enterprise. Selection indexes reflect both the short term profit generated by an animal through the sale of their progeny, and the longer term profit generated by their daughters in a self-replacing cow herd.

Using Selection Indexes in Animal Selection

Utilising selection index information to assist with selection decisions should be an important consideration for all seedstock and commercial beef producers.

One possible strategy of utilising selection index information is to:

1. Establish the breeding objective
2. Identify the selection index of most relevance
3. Rank animals on the selection index
4. Consider the individual EBVs of importance
5. Consider other selection criteria

1. Establish a Breeding Objective

Selection indexes do not change the key elements of the success in any breeding program, being careful planning, the use of good information to assist in decision making, and, above all, consistency and patience in the pursuit of desired breeding goals.

Before considering selection index information, it is important that producers develop a clearly defined plan of what they are attempting to achieve from their breeding program. This may be described as setting a breeding objective or breeding goals.

There are many aspects that can be considered when establishing a breeding objective.

For example, considerations should be given to the relative economic importance of different traits, future customer requirements, future herd production targets and current herd performance.

2. Identify the Selection Index of Most Relevance

Once a breeding objective has been established, the next important step is to identify a selection index that is consistent with this breeding objective.

There are ten selection indexes currently calculated for animals within the TransTasman Angus Cattle Evaluation (TACE) analysis.

Index Name	Abbreviation
Angus Breeding Index	\$A
Domestic Index	\$D
Heavy Grain Index	\$GN
Heavy Grass Index	\$GS
Angus Breeding Low Feed Cost Index	\$A-L
Domestic Low Feed Cost Index	\$D-L
Heavy Grain Low Feed Cost Index	\$GN-L
Heavy Grass Low Feed Cost Index	\$GS-L
AngusPRO Index	\$PRO
Angus Terminal Sire Index	\$T

The Angus Breeding Index and the Angus Breeding Low Feed Cost Index are general purpose selection indexes that are suitable for use in the majority of commercial beef operations, whereas the Domestic, Domestic Low Feed Cost, Heavy Grain, Heavy Grain Low Feed Cost, Heavy Grass, Heavy Grass Low Feed Cost and the AngusPRO indexes are specific to beef operations targeting a defined production system and market endpoint. The Angus Terminal Sire Index is designed for use in situations where Angus bulls are being used as a terminal sire over mature breeding females.

More detailed information regarding each of the four selection indexes that are calculated for animals within the TACE analysis is available from www.angusaustralia.com.au.

In considering which of these selection indexes is of most relevance, producers should:

- consider the description of the selection index.
- evaluate the relevance of the production system (where applicable)
- review the main traits that are important within the breeding objective described by the selection index. This is often referred to as the key profit drivers.
- evaluate the weightings that are being put on each EBV within the selection index.
- consider the predicted response to selection in each individual trait if animals are selected based on the selection index.

If following review of the selection indexes calculated within TACE, beef producers deem that none are relevant to their operation, the development of a customised index using herd-specific production information and marketing goals can be considered. Further information regarding the development of customised indexes can be found on the BreedObject website (www.breedobject.com) or by contacting staff at Angus Australia.

Angus Selection Indexes

Angus Breeding Indexes	<ul style="list-style-type: none"> · Self replacing herd · Daughters are retained for breeding · Identifies animals that will improve overall profitability in the majority of commercial, self replacing, grass and grain finishing beef production systems. · \$A includes an objective of maintaining mature cow weight, whereas the \$A-L does not include this objective
Domestic Indexes	<ul style="list-style-type: none"> · Self replacing herd · Daughters are retained for breeding · Steer progeny are either finished using pasture, pasture supplemented by grass or grain (eg. 50-70 days) · Steer progeny slaughtered at a carcass weight of 280kg at 16 months of age · Eating quality traits important to suit MSA program · \$D includes an objective of maintaining mature cow weight, whereas the \$D-L does not include this objective
Heavy Grain Indexes	<ul style="list-style-type: none"> · Self replacing herd · Daughters are retained for breeding · Steer progeny pasture grown with a 250 day feedlot finishing period · Steer progeny slaughtered at a carcass weight of 455kg at 24 months of age · Targeting high quality, highly marbled markets with a significant premium for superior marbling · \$GN includes an objective of maintaining mature cow weight, whereas the \$GN-L does not include this objective
Heavy Grass Indexes	<ul style="list-style-type: none"> · Self replacing herd · Daughters are retained for breeding · Steer progeny finished on pasture · Steer progeny slaughtered at a carcass weight of 350kg at 22 months of age · Eating quality traits important to suit MSA program · \$GS includes an objective of maintaining mature cow weight, whereas the \$GS-L does not include this objective
Angus Terminal Sire Index	<ul style="list-style-type: none"> · Terminal breeding program where Angus bulls are being used as a terminal sire over mature females · All progeny, both male and female, are slaughtered · Focus on increasing growth, carcass yield and eating quality. · No emphasis is given to female fertility or maternal traits.
Angus-PRO Index	<ul style="list-style-type: none"> · New Zealand production system · Self replacing herd · Daughters are retained for breeding · Steer progeny are finished on pasture for the AngusPure programme. · Steer progeny slaughtered at a carcass weight of 290 kg at 20 months of age · Significant premium for steers that exhibit superior marbling

Identifying the selection index of most relevance to the production system that the animals will be used in is of utmost importance. Using the wrong selection index will potentially compromise any subsequent selection decisions that are made.

3. Rank Animals on Selection Index

Once the selection index of most relevance has been identified, the animals available for selection should then be ranked on that particular selection index.

When ranking animals on a selection index, it is important to note:

- Selection indexes can only be used to rank animals analysed within the TACE analysis. As with EBVs, the selection indexes calculated for animals in different genetic evaluations are not directly comparable.
- In addition to ranking the animals available for selection, producers can use selection indexes to benchmark where an animal ranks compared to other animals analysed within the TACE analysis by comparing its selection index value to the current breed average value and to the percentile table.

Current breed average and percentile table information for each selection index can be accessed from the online database facilities offered via Angus Australia and are routinely provided in sale and semen catalogues.

4. Consider Individual EBVs of Importance

Having ranked animal's on the selection index of relevance, it is important to pay attention to each animal's EBVs for traits of particular importance in the individual breeding program.

For example, producers may pay attention to:

- Calving Ease EBVs if they are planning to use the bull over heifers
- Mature Cow Weight EBVs if monitoring the weight of mature cows is of particular importance
- Fat EBVs if they require more or less fat on their steers at slaughter
- EMA EBVs if they want to specifically improve the muscling in their herd

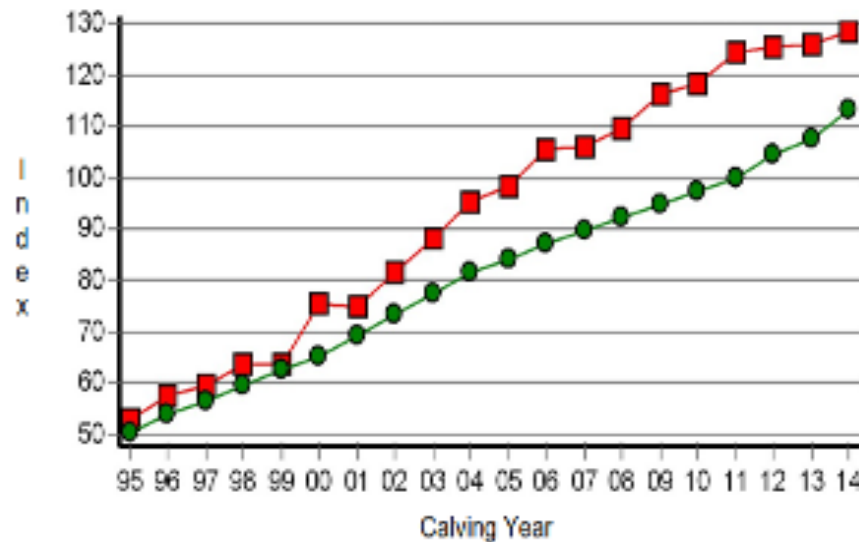
One simple way of considering an animal's individual EBVs, is to set acceptable ranges for the individual EBVs of particular importance. In this scenario, animals would firstly be ranked on the selection index of relevance but then any animal whose individual EBVs fall outside of the acceptable range be excluded from selection.

It is also important to note that not all EBVs are currently included in the calculation of the selection index values. For example, Net Feed Intake, Docility and Structural Soundness EBVs are currently excluded. In a similar vein to that outlined above, if these EBVs are of importance then animals should firstly be ranked on the selection index of relevance but then any animal whose EBV falls outside of an acceptable range for these traits be excluded from selection.

5. Consider Other Selection Criteria

In addition to consideration of individual EBVs, it is also important to consider other selection criteria that may not be accounted for in the calculation of the index.

For example, this may include such things as assessment of an animal's temperament, structural soundness, phenotype, fertility status, carrier status for any relevant genetic disorders, pedigree and DNA results for qualitative traits like coat colour.



Selection indexes can be used to track the overall genetic progress that is being achieved within a breeding program

One strategy that can be used to incorporate selection for these other traits of economic and functional importance with the animal's EBV and selection index information is to firstly rank animals on the selection index of relevance, exclude any animals whose individual EBVs fall outside of an acceptable range and then assess the animals for these other traits of importance, excluding any animals

from selection who are not acceptable in each area.

Other Considerations When Using Selection Indexes

1. Quantify the Value of Superior Genetics

The selection indexes that are calculated within TACE are generated using a software package called BreedObject which has been developed at the Animal Genetics and Breeding Unit (AGBU) in Armidale.

BreedObject combines the TACE EBVs for an animal with an economic weighting (based on costs of production and returns on outputs), to produce a single value of an animal's overall genetic value. Selection indexes are expressed in units of net profit per cow joined (\$) for this defined production system and market scenario and consequently enable an assessment to be made of the value of superior genetics.

For example, if a bull with a selection index value of +\$150 is compared with a bull that has a selection index value +\$120, the difference in net profit from the two bulls can be estimated as follows:

$$\begin{aligned} &= \frac{1}{2} \times \text{difference in Index} \\ &= \frac{1}{2} \times (150-120) \\ &= \$15 \text{ per cow joined} \end{aligned}$$

If the two bulls were joined to 200 cows during their breeding life, this would equate to a difference of $(200 \times \$15) = \3000 .

It is important to note that this difference should be considered as a broad guide only. The difference includes profit across all sectors of the production chain from joining to slaughter and also considers the long term profit generated by a sire's daughters. Whether the value is obtained will also be dependent upon whether the economic parameters that have been built into the calculation of the selection index apply to the individual production system in which the bulls are being joined.

2. Track Genetic Progress in Breeding Program

As selection indexes provide an overall "score" of animals' genetic value, selection indexes can be used to track the overall genetic progress that is being achieved within a breeding program.

For example, seedstock producers can analyse the change in the average selection index value for their animals over time by reviewing the selection index trend graphs provided in the TACE report for their herd. Similarly, commercial producers can review the selection index values of the bulls that they have purchased over time by reviewing sale catalogues or the online animal and EBV enquiry database provided by Angus Australia.

Using selection indexes in this manner will enable beef producers to make the most informed animal selection decisions and provides the best possibility of maximising the value of the genetics that are introduced into the beef operation.