Better Bull Selection Using Hereford Selection Indexes

The major influence that beef producers have on the genetics of their herd is through the bulls that they select for use within their breeding program. Selecting bulls with the best genetic package for their operation represents a powerful opportunity to significantly improve the future profitability of their beef enterprise.

The bulls selected not only have a large influence on the performance of the calves produced by the enterprise in the following few years, but in self replacing operations, their daughters influence the performance of the herd for many years to come. In effect, 87.5% of the genetic composition of the calves produced is determined by the sires used in the past 3 generations.

Importantly, beef producers have a range of information to assist them with bull selection and purchase decisions. One such piece of information are selection index values.

Selection indexes are utilised by livestock breeders around the world and across many species and aid in the selection of animals for use within a breeding program where there are several traits of economic or functional importance. Selection indexes provide an overall “score” of an animal’s genetic value for a specific purpose and are calculated based on weightings placed on individual traits that are deemed to be important for that purpose. Selection indexes enable beef producers to make “balanced” selection decisions, taking into account the relevant growth, carcase & fertility attributes of each bull to identify the animal that is most profitable for their particular commercial enterprise. Selection indexes reflect both the short term profit generated by a bull through the sale of his progeny, and the longer term profit generated by his daughters in a self replacing cow herd.

In the Australian beef industry, selection indexes are now calculated for all the major breeds, including Hereford. The selection indexes for Hereford have been developed by Herefords Australia and are designed to cater for the commercial market production systems of general relevance to the Hereford breed. The selection indexes are calculated using a software package called BreedObject which combines the BREEDPLAN 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. Different selection index values are calculated for the same animal for different production systems and market end points.
Using Hereford Selection Indexes in Bull Selection

As a guide to using selection indexes when selecting Hereford bulls for use within a breeding program, it is recommended that producers, both seedstock and commercial, complete the following steps:

(i) Identify the selection index of most relevance
(ii) Rank animals on the selection index
(iii) Consider the individual EBVs of importance
(iv) Consider other traits of importance

1. Identify the Selection Index of Most Relevance

The first step when using selection indexes is to identify the index that is of most relevance to the particular production system in which the animal is going to be used. For seedstock producers, this may be the production system of their bull buying clients.

There are now four different selection indexes calculated for Hereford animals. A brief description of each index is provided below.

Supermarket Index - Estimates the genetic differences between animals in net profitability per cow joined for an example commercial herd targeting the domestic supermarket trade. Steers are either finished on grass or grain (eg. 50 – 70 days). Steers are assumed marketed at 450 kg live weight (250 kg HSCW and 12 mm P8 fat depth) at 17 months of age. Daughters are retained for breeding. In response to industry feedback regarding eating quality and tenderness, a small premium has been placed on marbling.

Grass Fed Steer Index - Estimates the genetic differences between animals in net profitability per cow joined for an example commercial herd targeting pasture finished steers. Steers are assumed marketed at 600 kg live weight (330 kg HSCW and 8 mm P8 fat depth) at 23 months of age. Daughters are retained for breeding. In response to industry feedback regarding eating quality and tenderness, a small premium has been placed on marbling.

Grain Fed Steer Index – Estimates the genetic differences between animals in net profitability per cow joined for an example commercial herd targeting pasture grown steers with a 125 day feedlot finishing period for the grain fed markets. Steers are assumed marketed at 600 kg live weight (330 kg HSCW and 20 mm P8 fat depth) at 20 months of age. Daughters are retained for breeding. There is a significant premium if steers reach a marble score of 2 or greater.

EU Index – Estimates the genetic differences between animals in net profitability per cow joined for an example commercial herd targeting pasture finished steers for the EU market. Steers are assumed marketed at 620 kg live weight (340 kg HSCW and 14 mm P8 fat depth) at 24 months of age. Daughters are retained for breeding. There is no marbling requirement.
Further information regarding each of these indexes is available from the Tip Sheets page in the Technical area of the BREEDPLAN website (http://breedplan.une.edu.au). From the home page, click “Technical” then “BREEDPLAN Tip Sheets” and scroll down to the section titled “Interpreting Australian Hereford Selection Indexes”. Within this area, further details are provided such as the relative emphasis that is being placed on each EBV in the calculation of the different selection indexes, and the expected change in each individual trait if animals are selected based on the different selection indexes. Information is also available regarding the indexes that are calculated in other breeds.

If the standard selection indexes are not relevant to their operation, beef producers also have the ability to develop a customised index using herd-specific production information and marketing goals. Further information regarding the development of customised indexes can be found on the BreedObject website (www.breedobject.com).

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

2. Rank Animals on Selection Index

Once the selection index of most relevance has been identified, the bulls available for selection should then be ranked on that particular selection index. An example of this is provided below, where a group of sires within the Hereford breed have been ranked in descending order on the Grain Fed Steer index.

<table>
<thead>
<tr>
<th>Name of Bull</th>
<th>Grain Fed Steer Index</th>
<th>Beef in Hand</th>
<th>Stabilised</th>
<th>Carcass Value</th>
<th>Birth Weight</th>
<th>Body Condition Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>KUDRINA ADVANCE YD01 (P)</td>
<td>2.8</td>
<td>+0.2</td>
<td>-0.6</td>
<td>+3.2</td>
<td>-0.3</td>
<td>+5.6</td>
</tr>
<tr>
<td>SOUTH BULGARIA VALLEY 32 (P)</td>
<td>1.2</td>
<td>+0.2</td>
<td>-0.5</td>
<td>-0.7</td>
<td>+5.8</td>
<td>-0.9</td>
</tr>
<tr>
<td>ARDO MUSTER (110) (MP)</td>
<td>2.0</td>
<td>+0.1</td>
<td>-0.1</td>
<td>+3.9</td>
<td>-0.5</td>
<td>+5.8</td>
</tr>
<tr>
<td>MOUNT MIDDLE COUNTER (P)</td>
<td>-3.4</td>
<td>-0.9</td>
<td>0.1</td>
<td>+5.1</td>
<td>+9.1</td>
<td>-0.3</td>
</tr>
<tr>
<td>MELVILLE PARK ASTON 979 (P)</td>
<td>0.3</td>
<td>-0.3</td>
<td>-0.3</td>
<td>+7.4</td>
<td>-2.0</td>
<td>+0.5</td>
</tr>
<tr>
<td>MOUNT MIDDLE CASBURY (P)</td>
<td>7.6</td>
<td>+0.3</td>
<td>0.2</td>
<td>+5.0</td>
<td>-0.3</td>
<td>+5.0</td>
</tr>
<tr>
<td>KUDARANA SPARK 300 (ETU) (MICH) (ETU)</td>
<td>2.7</td>
<td>+0.1</td>
<td>-0.3</td>
<td>+5.4</td>
<td>+0.4</td>
<td>+5.2</td>
</tr>
<tr>
<td>KURPIRRA EXPLORER 133 (ETU) (ETU)</td>
<td>6.1</td>
<td>0.8</td>
<td>0.3</td>
<td>+1.6</td>
<td>-0.1</td>
<td>+0.7</td>
</tr>
<tr>
<td>MOUNT MIDDLE JUMBO (ETU) (ETU)</td>
<td>5.3</td>
<td>-1.8</td>
<td>0.2</td>
<td>+3.2</td>
<td>+5.2</td>
<td>-0.3</td>
</tr>
<tr>
<td>PIPE WEL CROSSFIRE CEE1 (P)</td>
<td>5.5</td>
<td>+0.2</td>
<td>0.0</td>
<td>+1.6</td>
<td>-0.9</td>
<td>+5.0</td>
</tr>
<tr>
<td>SOUTH BULGARIA SPARROW (P)</td>
<td>1.7</td>
<td>+0.2</td>
<td>0.2</td>
<td>+5.0</td>
<td>-0.7</td>
<td>+5.0</td>
</tr>
<tr>
<td>KURPIRRA ADVANCE YB01 (P)</td>
<td>4.7</td>
<td>-0.5</td>
<td>0.3</td>
<td>+3.2</td>
<td>+0.8</td>
<td>+5.2</td>
</tr>
<tr>
<td>KURPIRRA WESTWIND 99 (P)</td>
<td>0.6</td>
<td>-0.3</td>
<td>0.2</td>
<td>+4.9</td>
<td>+0.5</td>
<td>-0.3</td>
</tr>
<tr>
<td>BRIPIC CROSSFIRE CEE1 (P)</td>
<td>4.4</td>
<td>-1.1</td>
<td>0.5</td>
<td>+3.2</td>
<td>-0.9</td>
<td>+5.0</td>
</tr>
<tr>
<td>SOUTH BULGARIA EXECUTE 14 (ETU) (ETU)</td>
<td>5.1</td>
<td>+0.1</td>
<td>-0.1</td>
<td>+4.3</td>
<td>-0.7</td>
<td>+5.0</td>
</tr>
</tbody>
</table>

When ranking bulls on a selection index, producers should note:

- Selection indexes cannot be used to rank animals across breeds. As with EBVs, the selection indexes for animals of different breeds are calculated in different evaluations and consequently, selection indexes can only be used to compare bulls with other animals of the same breed.
• Producers can use selection indexes to see where a bull ranks compared to other Hereford animals by comparing its selection index value to the current breed average value and to the percentile table. For example in the above example, comparison to the breed average value listed at the bottom of the table of +65 indicates that all sires are expected to have genetics that are more profitable than the current genetic level of the breed if used within this production scenario.

Current breed average and percentile table information for each selection index should be available from sale catalogues or can be accessed from the online database facilities offered via the Herefords Australia website.

3. Consider Individual EBVs of Importance

While Selection Indexes combine all the available EBV information to provide an indication of a bull’s overall genetic merit, it is still very important to pay attention to the bull’s individual EBVs for traits of particular importance.

For example, producers may pay attention to:
• Calving Ease Direct EBVs if they are planning to use the bull over heifers
• 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 a bull’s individual EBVs, is to set acceptable ranges for the individual EBVs of particular importance. Bulls should firstly be ranked on the selection index of relevance but then any animals whose individual EBVs fall outside of the acceptable range be excluded from selection.

4. Consider Other Traits of Importance

While selection indexes take into account all the available performance information on an animal, it is also important to recognise that they do not consider all the traits of functional and economic importance. Consequently, when using selection indexes to assist with bull selection, it is important to also consider other information that may not be accounted for in the index but is important within the breeding objective. For example, this may include such things as assessment of a bull’s temperament, structural soundness, bull fertility information, carrier status for any relevant genetic disorders and DNA results for qualitative traits like polledness.

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

For further advice regarding the use of selection indexes in bull selection, please contact Andrew Byrne at Southern Beef Technology Services on (02) 6773 3357.

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