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Making Bull Selection Decisions for Heifer Matings

There are numerous factors which need to be considered when selecting a bull to mate over heifers. In many cases, the primary aim of the beef producer is to produce a live calf which is born unassisted, with other economic traits (e.g. growth) of secondary importance. Traditionally this has been done by selecting a 'heifer bull' to mate over the heifers; that is, a bull with a low birth weight EBV which will produce small calves which are easily calved down by the heifer. However, as birth weight is highly correlated with the other growth traits (e.g. 200, 400 and 600 Day Weight), this has traditionally been done at the expense of later growth. For those that are breeding replacement females, this has longer term implications for the genetic progress of the herd as a whole.

The need for heifer bulls is of more importance for herds which are calving in spring compared to autumn, and for herds which are grazing improved pastures compared to native pastures. This is because calves born from dams which have been on good nutrition during pregnancy are heavier at birth than calves born from dams on poorer nutrition.



This article will discuss which BREEDPLAN traits are of particular importance when selecting

heifer bulls. In addition, this article will outline the relationships between these traits, and the trade-offs that need to be considered when making these selection decisions. While this article has been written to focus on bull selection for heifers having their first calves, where the birth and fertility traits are of particular importance, these concepts are also applicable when considering bull selection for cow matings.



Birth Weight

Birth Weight EBVs are estimates of the genetic difference between animals for birth weight, expressed in kilograms. Small or moderate Birth Weight EBVs are more favourable, and indicate lighter birth weights. For example, a bull with a Birth Weight EBV of +1 kg would be expected to produce lighter calves at birth than a bull with a Birth Weight EBV of +7 kg, with a lower risk of a difficult birth.

The importance of considering Birth Weight EBVs when selecting bulls to mate to heifers was highlighted at a recent herd visit. At this particular stud, the producer had used a team of bulls which had Birth Weight EBVs which were approximately double the breed average. These bulls had some of the heaviest Birth Weight EBVs



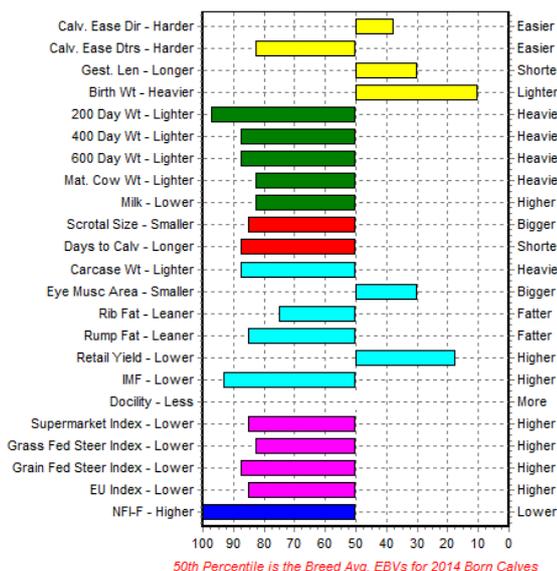
in the entire breed. This bull team had been mated to the heifers; not surprisingly approximately 50% of these heifers needed assistance at calving.

This had a number of flow on effects for the business. In particular, this led to:

- Many sleepless nights checking heifers and pulling calves during the calving period.
- A greater number of vet visits and associated costs during the calving period.
- Some mortalities – both heifers and calves.

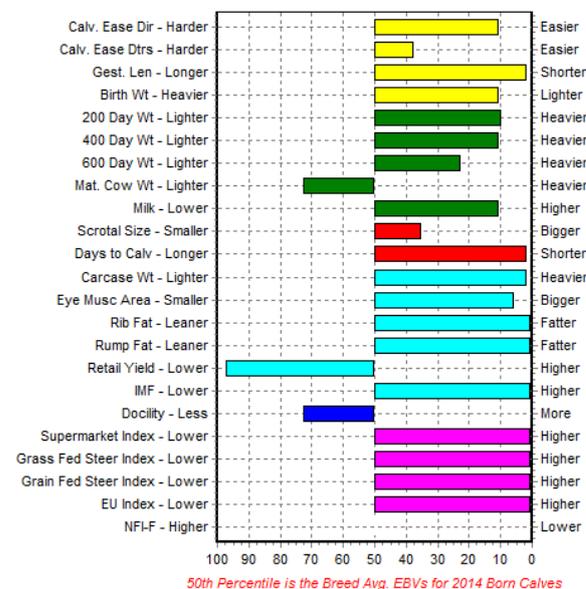
While selecting an animal with a low to average Birth Weight EBV to use over heifers should help to reduce calving difficulties, correlations between birth weight and other traits need to be considered. Specifically, lower birth weight sires may cause fewer calving difficulties, but they also tend to produce calves with poorer growth to target market endpoints.

The sire below is a good example of this. This sire has a Birth Weight EBV which is below breed average, being in the 10th percentile of the breed for birth weight. However his EBVs for 200, 400 and 600 Day Growth are all well below breed average.



Fortunately, there are bulls out there that are “curvebenders”; that is, those bulls that have below average Birth Weight EBVs but above average Growth EBVs. A good example of this is

the bull below. Like the first bull, this bull is also in the 10th percentile of the breed for birth weight. However, unlike the first bull, this bull has good growth EBVs, being above breed average for 200 Day Weight (10th percentile), 400 Day Weight (10th percentile) and 600 Day Weight (25th percentile).



All other factors being equal (e.g. structure), the second bull would be a better choice to mate over heifers. Both bulls would be expected to produce calves which are lighter than the breed average for birth weight, thus reducing the chance of calving difficulties, which is an important trait for a heifer bull. However, the second bull has better growth EBVs, and thus his calves would be expected to have better growth to target market endpoint than the calves of the first bull.

Gestation Length

Another trait to consider when selecting a heifer bull is gestation length. Gestation Length EBVs provide an estimate of genetic differences between animals in gestation length, and are expressed in days.

Lower or more negative Gestation Length EBVs are considered to be more favourable. For example, a bull with a Gestation Length EBV of –2 days would be expected to produce calves that are born earlier than a bull with a Gestation Length EBV of +2 days.

Gestation length is favourably correlated with birth weight and calving ease. In general:



- As gestation length decreases, birth weight also decreases. Similarly, as gestation length increases, birth weights also increase.
- As gestation length decreases, calving difficulties decrease. The converse is also true; as gestation length increases, calving difficulties also increase.

Calves which have had a shorter gestation length are generally smaller, and thus the dam is able to deliver her calf with less difficulty. Therefore, when selecting heifer bulls, consideration should be given to the Gestation Length EBVS of the candidates.



Calving Ease

Whilst many large studies have consistently shown birth weight to be the most important genetic factor influencing calving difficulty, there are also other aspects that need to be considered. For example, calf shape, pelvic area and calving “will” all influence calving ease. BREEDPLAN Calving Ease EBVs attempt to take all the factors affecting calving difficulty into consideration and allow the best possible genetic improvement to be made for ease of calving.

Two Calving Ease EBVs are produced by BREEDPLAN; these are Calving Ease Direct and Calving Ease Daughters.

1. Calving Ease DIRECT

Calving Ease Direct EBVs are estimates of genetic differences in the ability of a sire’s calves to be born unassisted from 2 year old heifers. Calving Ease Direct EBVs are reported as differences in the percentage of unassisted calvings.

Higher, more positive, Calving Ease Direct EBVs are more favourable. For example, a bull with an EBV of +5.0% would be expected, on average, to produce 3% fewer difficult calvings from 2 year old heifers than a bull with an EBV of -1.0% (6% difference between the sires, then halved as they only contribute half the genetics).

2. Calving Ease Daughters

Calving Ease Daughters EBVs are estimates of genetic differences in the ability of a sire’s 2 year old daughters to calve without assistance. Calving Ease Daughters EBVs are also reported as differences in the percentage of unassisted calvings.

Higher, more positive, Calving Ease Daughters EBVs are more favourable. For example, a bull with an EBV of +4.0% would be expected to on average produce 2 year old daughters that have 3% less calving problems than the daughters of a bull with an EBV of -2.0%.

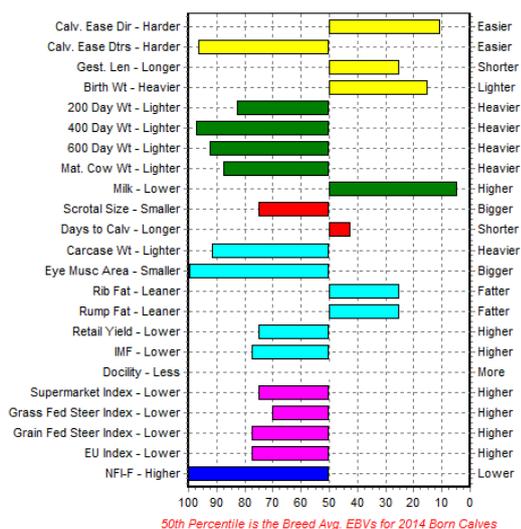


When selecting heifer bulls, more positive Calving Ease Direct EBVs are more favourable. However, Calving Ease Daughters EBVs should also be considered, with more positive Calving Ease Daughters EBVs also desirable for heifer bulls.

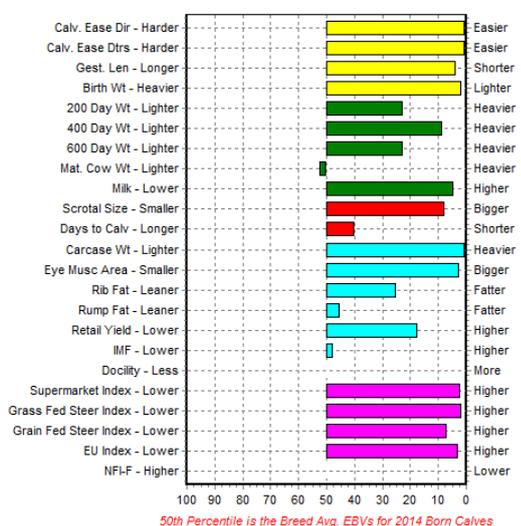
The relationship between the two Calving Ease EBVs is generally antagonistic. As Calving Ease Direct increases, Calving Ease Daughters typically decreases. This is because a bull with a high Calving Ease Direct EBV will generally produce smaller calves. As his daughters grow, they tend to develop into smaller cows, with smaller pelvises. Thus, when they calve as heifers, they are more likely to have calving problems than bigger, more roomy heifers.



The bull below is a good example of the antagonist relationship between Calving Ease Direct and Calving Ease Daughters. This bull has a Calving Ease Direct EBV well above the breed average, but a Calving Ease Daughters EBV well below breed average. This bull may help to reduce calving difficulties in the current heifers, but his daughters may experience calving difficulties when they themselves are heifers. For those in a self-replacing herd situation, this is not desirable, as this can have a negative impact on the calving ease of the herd into the future.



Luckily, as is the case with birth weight and growth, curve-bender bulls also exist for calving ease traits. Curve-benders in this situation are those bulls who have above average EBVs for both Calving Ease Direct and Calving Ease Daughters. The bull below is a good example, having some of the top Calving Ease Direct and Calving Ease Daughters EBVs within this particular breed.



For those with self-replacing herds, selecting heifer bulls with above average Calving Ease Direct and Calving Ease Daughters EBVs is especially important, both for reducing calving problems in the current heifers and those in the future. For those beef producers who are producing male and female calves for a terminal market, Calving Ease Direct will be of importance while Calving Ease Daughters may not be.

Best Practice Guide to Selecting Heifer Bulls

The traits discussed so far in this article are not inherited individually; they are correlated with each other. Relationships also exist with other traits of economic importance. Therefore, placing selection pressure on one trait could push other traits in an unfavourable direction.

To avoid this, it is recommended that heifer bulls are selected using selection indexes. Selection indexes rank animal on profit (dollars per cow mated), within a specific production to market scenario. They have been designed to balance genetic improvement across traits, thus taking the hard work out of deciding how much emphasis to place on each individual trait.

To use selection indexes to select heifer bulls:

1. *Identify the selection index of most relevance*
Identify which selection index available for your breed best fits your breeding objectives.
2. *Rank animals on selection index*
Rank bulls available for selection on the selection index of most relevance.
3. *Consider fertility and birth traits*
Animals with the same selection index value can have very different individual EBVs. Consider the Calving Ease Direct, Calving Ease Daughters, Birth Weight and Gestation Length EBVs and exclude any bulls which don't have EBVs in acceptable ranges.
4. *Consider other traits*
Consider EBVs for all other traits of economic importance, as per your breeding objective. Exclude any bulls



which don't have EBVs in acceptable ranges.

5. *Consider other information*

Consider other selection criteria of importance (e.g. horn status, structural and functional soundness and genetic condition status). Exclude any bulls that do not meet requirements.

This approach should allow beef producers to select heifer bulls which, in addition to reducing the risk of calving problems in their heifers, should also improve other economically important traits within the herd.



Take Home Message

When selecting heifer bulls, selection indexes should be used to rank bulls on economic merit. Particular consideration should then be given to Birth Weight, Gestation Length, Calving Ease and Growth EBVs. Other traits which are of importance to the breeding objectives for the herd, and other information should also be considered before finalising selection decisions.

When selecting heifer bulls, remember:

- While lower birth weight is generally associated with lower growth, curve-bender bulls do exist. Where possible, try to select bulls with low to average Birth Weight EBVs and above average Growth EBVs. This should equate to smaller calves at birth, thus reducing the likelihood of calving difficulties, without compromising on growth as the calf gets older.
- Shorter gestation lengths are more favourable. Bulls who have shorter Gestation Length EBVs should sire calves who are born earlier than those sired by bulls with longer Gestation Lengths. Thus the progeny of bulls with shorter Gestation Length EBVs are generally smaller at birth, and in turn, more likely to be delivered with less calving difficulties.
- Bulls with higher, more positive Calving Ease Direct EBVs are more favourable, as they are more likely to have calves that are born unassisted from 2 year old heifers. For those in self-replacing herd situations, higher, more positive Calving Ease Daughters EBVs are also desirable in a heifer bull. These two traits need to be carefully managed to avoid decreasing the calving ease ability of future heifers.

For further information regarding selection of heifer bulls, or to discuss the relationships between the traits discussed in this article, please contact staff at SBTS or TBTS.