

# The Case for Genotyping Females

While females contribute 50% to the genetics of their offspring, there is often a tendency amongst beef producers to concentrate on the male side of the pedigree. While individual bulls typically have a bigger influence on the herd than individual cows, simply because they produce more progeny, females also play a role in the genetic improvement of the herd. This article will explore reasons why beef producers may consider genotyping their females and discuss strategies to genotype the female herd.

## WHY GENOTYPE FEMALES?

Just as there are a variety of reasons to genotype male animals, there are a number of reasons why beef producers may consider genotyping their female herd. These include:

### 1. Parentage Verification

This could be for parentage verification of the female animal and/or parentage verification of her future calves. While not all breed societies mandate compulsory parentage verification (to both the sire and dam) for all animals, some producers may wish to parent verify their animals to have more certainty regarding their pedigrees.

Unfortunately, experience has shown that even in the best managed herds, parentage errors can still occur. Possible reasons for parentage errors include multi-sire matings, rogue bulls, uncertainty as to whether the AI bull or the back-up bull is the sire, mismothering and/or human error.

### 2. Management of Genetic Conditions and Qualitative Traits

Beef producers may wish to genotype female animals to understand their genetic condition status and/or qualitative trait status (e.g. coat colour, horn/poll status). For producers who wish to know the genetic condition status of their females (for example, to avoid carrier to carrier matings if using a carrier bull) genotyping select females may be of interest.

### 3. Genomics

For the breeds that have Single-Step BREEDPLAN (Angus, Brahman, Hereford and Wagyu), genomic information contributes to EBVs of both male and female animals. Producers who have these breeds may wish to genotype their heifer drop prior to making replacement decisions, to ensure that they have the most accurate EBVs possible



before selection decisions are made. This can be highly beneficial as these young heifers typically have limited performance data and thus low EBV accuracy at this age. Alternatively, producers may wish to genotype a subset of females, such as high genetic merit females. There may also be a desire to genotype animals that are likely to be in single animal contemporary groups or small contemporary groups (e.g. ET calves, show animals, animals from a small herd).

Other breed societies are working towards implementing Single-Step BREEDPLAN; genotypes for animals in these breed societies are not currently contributing to the calculation of EBVs. Producers in these breed societies can help to build the reference population (animals with both performance data and genotypes; essential for genomics) by genotyping animals, including females, with performance data. Once a breed implements Single-Step BREEDPLAN, the benefits outlined in the paragraph above will also apply.

Often there is more than a single reason for genotyping an animal. Beef producers may decide to genotype female animals for a combination of reasons described above (e.g. for parentage verification, genetic condition management and genomics purposes). It is for this reason that many breed societies offer DNA "bundles" to their members, where producers can select to genotype animal for a variety of purposes (e.g. parentage verification, genetic conditions and genomics) in the

one test. Bundles are also cheaper than doing multiple individual tests.

## WHICH FEMALES SHOULD I GENOTYPE?

Deciding which females to genotype will vary from herd to herd, and will depend on the motivation for genotyping. For producers who are keen to do full parentage verification, all dams of the calves they wish to do parent verification on will need to be genotyped. This could be for all calves in a calving year, or a select subset (e.g. full parent verification on sale bulls only). Producers who are managing genetic conditions may wish to genotype cows from certain lines that contain known carriers. GeneProb results, where available, may assist producers to identify cows that have a high likelihood of being a carrier for a particular genetic condition. The animals that a producer wishes to genotype for genomics purposes may also vary, from a subset of females through to all heifers in the calving drop.

## STRATEGIES TO GENOTYPE THE WHOLE FEMALE HERD

Some breeders may be interested in genotyping all of the females in their herd. However, for many, the cost of genotyping all females in the herd in one hit can be prohibitive. Let us assume that the cost to genotype an animal on a 50K panel is \$60 (please note prices will vary, as some societies will offer bundles which include additional tests such as genetic conditions and/or

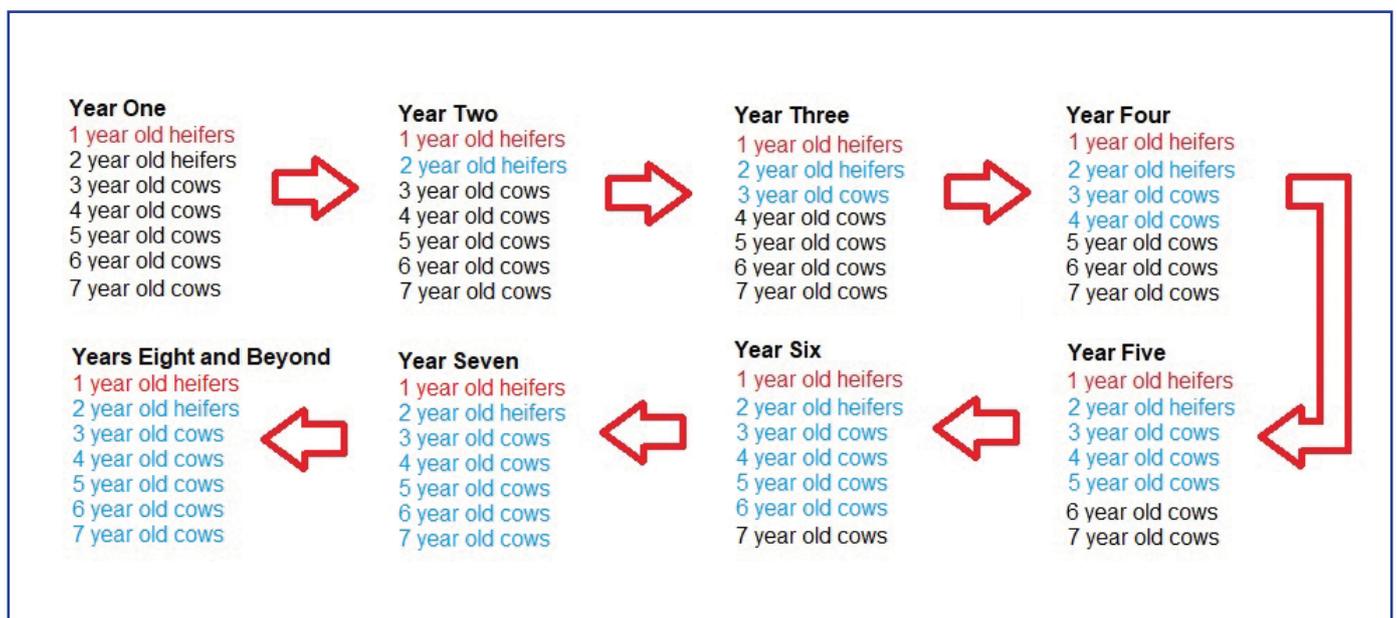


Figure 1. Genotyping one year old replacement heifers each year will allow beef producers to eventually reach the point where all females in the herd have genotypes. Animals genotyped in the current year are highlighted in red, while those that already have genotypes are highlighted blue.

parentage verification). For a herd with 200 cows, this would mean an outlay of \$12,000 to genotype all cows in the herd. An alternative strategy for beef producers to consider is genotyping their replacement heifers each year. While it will take longer to reach the point where all females in the herd have genotypes, the total cost of genotyping is spread across subsequent years.

An example of this strategy is shown in Figure 1. In this herd, cows are cast for age at 8 years of age. In year one, the 1 year old heifers are genotyped, while the remaining females (2 years old – 7 years old) do not have genotypes. In year two, the 1 year old heifers are genotyped, the 2 year old heifers already have genotypes (having been genotyped in year one), while the remaining females (3 years old – 7 years old) do not have genotypes. This cycle repeats each year, until, in year seven, all females in the herd have genotypes. In years eight and beyond, the 1 year old heifers are genotyped, ensuring that all females in the herd have genotypes going forward.

Of course, how long this takes to achieve depends on the age of the cows in the breeding herd, and which age group of cows are genotyped each year. For example, if cows are not cast for age until 10 years old, it will take longer to reach the point where all cows are genotyped.

No matter how many years it takes to reach the point where all cows are genotyped, it is recommended that producers start with the youngest heifers first. As the heifers are likely to remain in the herd for the longest time period of all the females, producers will be able to utilise their genotypes (e.g. to parent verify their calves) over subsequent years. From a genomics viewpoint, younger animals are also likely to benefit the most from the inclusion of genomics information in the calculation of their EBVs.

## CONCLUSION

There are several reasons that beef producers may wish to genotype their female herd, including parentage verification, management of genetic conditions and/or qualitative traits and for genomic purposes. However, for many, the costs of genotyping the whole female herd at the one time can be prohibitive. Beef producers who wish to genotype their breeding females may wish to consider doing so over multiple years, by genotyping the heifer portion of the herd each year until such a time that all females in the herd have genotypes. While slower to reach the point where all females in the herd have genotypes, this strategy has the advantage of spreading the cost of genotyping over subsequent years.

