

Completeness of Performance for Australian Herefords

INTRODUCTION

Just how much performance data is collected for Australian Herefords each year? Are certain traits better recorded than others? Given that this performance data is used to calculate BREEDPLAN EBVs, it is useful to review just how much data is collected for each trait, across the calving drops.

To do this, the 'Completeness of Performance' of report is examined. The 'Completeness of Performance' report should be familiar to Hereford BREEDPLAN members, as these are produced annually (as a minimum) for each BREEDPLAN herd. Just as the 'Completeness of Performance' report for an individual herd summarises the quantity of performance data that has been recorded in that herd for each calving year for a range of traits, the 'Completeness of Performance' report for the entire breed summarises how much data has been recorded in the entire breed.

This report will examine the amount of performance data that is collected for the entire Australian Hereford breed. The 2014 calving drop will be used as an example cohort, as, in the first half of 2017, these animals are now old enough to have had performance data collected for most of the BREEDPLAN traits. In contrast, the youngest of the 2015 drop, born in December 2015, may not yet have had ultrasound scanning data and/or 600 Day Weights collected.

ANIMAL DETAILS

The first section of the Completeness of Performance report outlines Animal Details, which include:

- The number of animals on file for each calving year and whether they are male or female.
- The sex ratio of each calving year (number of males versus number of females).
- The number of animals for each calving year with a sire and dam recorded.
- The number of animals for each calving year with a DOB recorded.
- The number of animals for each calving year born as a result of natural, AI and ET matings.

There are 25,031 calves in the 2014 calving drop. Of these, 12,090 are male and 11,698 are female, giving a sex ratio of 0.93. Over the past 10 calving drops, the sex ratio has fluctuated from 0.89 (2008 and 2013) to 0.96 (2011; Figure 1). While the sex ratio is expected to fluctuate, it is interesting to note that in each calving drop, there are more female calves than male calves registered with Herefords Australia Ltd. This is unexpected because by chance, it is expected that in some years more female calves will be born than male calves, and in other years, more male calves will be born in female calves.

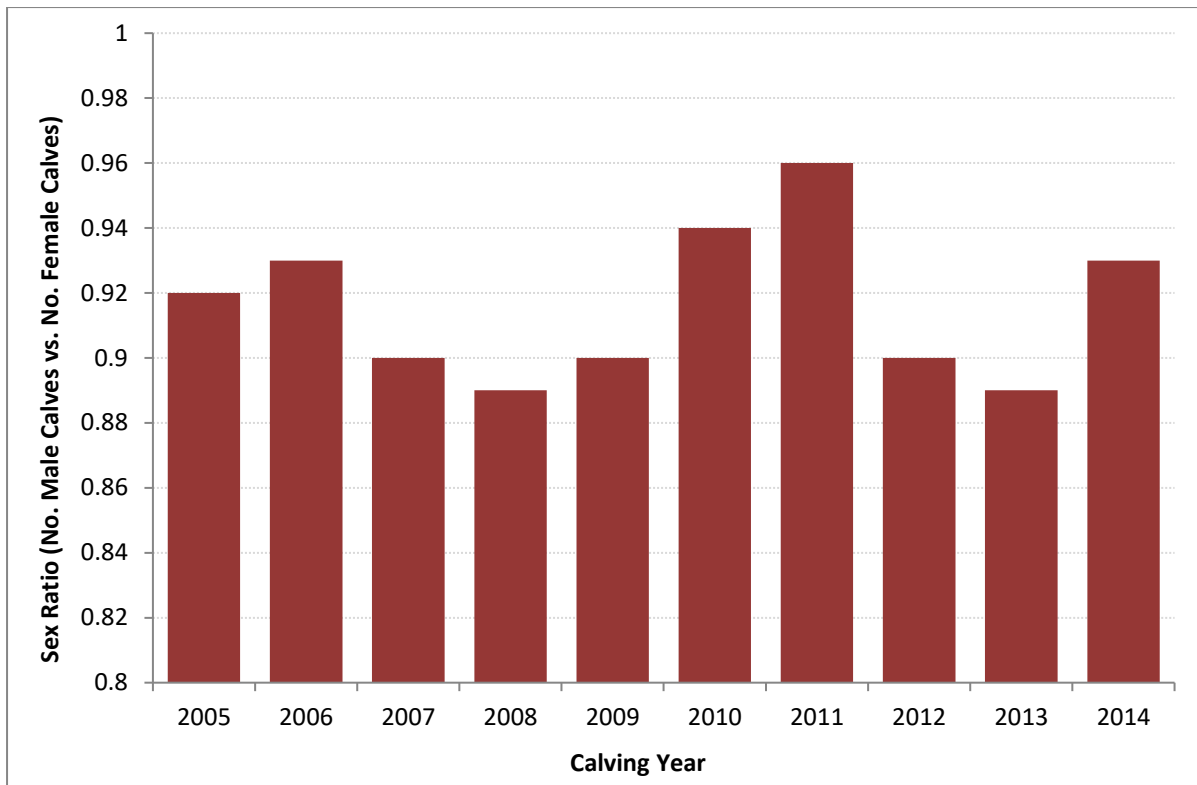


Figure 1. The sex ratio (number of male calves versus the number of female calves) for the 2005 to 2014 calving drops.

Unsurprisingly, 100% of the 25,031 calves born on 2014 and on the HAL database have a date of birth on file. 98% of these calves have a sire on file, and 98% have a dam on file.

Of the calves born in the 2014 drop, 78.1% were a result of natural matings, 19.4% were a result of AI matings and 2.5% were a result of ET (Figure 2). The percentage of AI and ET has been increasing in Australian Herefords in recent years, with 17.5% of calves registered in the 2005 calving drop a result of AI or ET, compared to 21.9% of calves in the 2014 calving drop (Figure 2). Most of this growth appears to be due to increased use of AI, with the AI matings increasing by 4.1% from 2005 to 2014 (Figure 2). In contrast, the use of ET has increased by just 0.3% in the same time period (Figure 2). While there has been increased use of AI and ET technology in recent years, the large percentage of calves born each year as a result of natural matings indicates that there is still room for considerable uptake of these reproductive technologies within the breed as a whole.

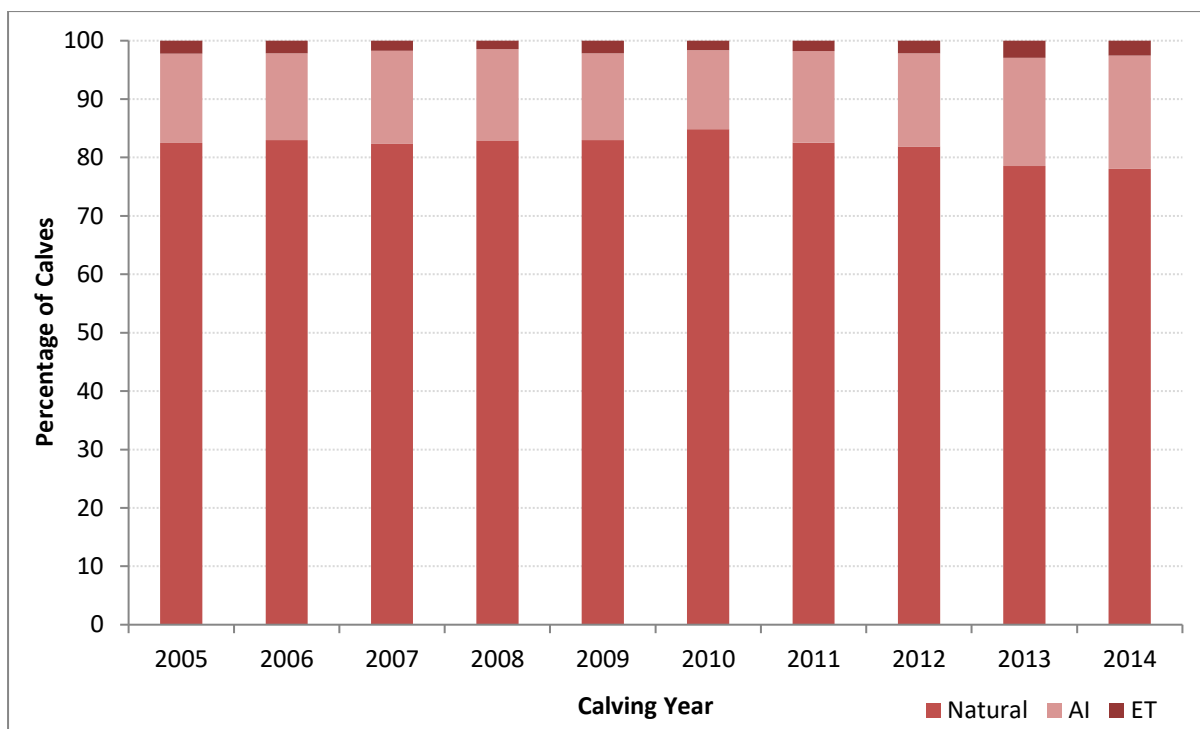


Figure 2. The percentage of calves in the 2005 to 2014 calving drops born as a result of Natural matings, AI matings and ET.

WEIGHT TRAITS

The weight traits – 200 day weight, 400 day weight, 600 day weight and mature cow weight – are examined in the second section of the Completeness of Performance Report. Of the 2014 calving drop, 59% have a 200 day weight on file (Figure 3). This decreases to 43% for 400 day weight, and 29% for 600 day weight (Figure 3). Both the percentage of calves with weight data on file, and the trend of decreasing percentages of calves with 200, 400 and 600 day weights, are fairly consistent with previous calving years. In the 2012 and 2013 calving drops, 61% and 59% respectively had a 200 day weight on file. This decreased to 38% and 43% respectively for 400 day weight, and further decreases to 28% in both calving years for 600 day weight.

It is not unexpected to see the percentage of calves with weights fall from 200 to 400 to 600 day weight; animals do drop out of the production system at various stages. Wherever possible, Hereford breeders should try and weigh all calves before culling and/or selling a percentage of the group. For example, a producer who sells a number of calves when they are 3-4 months (90-120 days) of age should take a 200 day weight on all calves before sale. While the calves won't be 200 days of age, they are old enough for a 200 day weight to be taken (Table 1). Equally, a producer who sells a number of calves as yearlings should take a 400 day weight on all calves before selling a subset of the calves. Table 1 gives the age ranges for collecting 200, 400 and 600 day weights for BREEDPLAN.

Table 1. The age at which a calf can have a 200, 400 or 600 day weight recorded for BREEDPLAN.

Trait	Age Range
200 Day Weight	80-300 days
400 Day Weight	301-500 days
600 Day Weight	501-900 days

When the percentage of male calves and female calves in the 2014 calving drop with weights on file is compared, it is clear that a greater percentage of male calves have a weight on file than heifers (Figure 3). In the 2014 calving drop, 6%, 4% and 3% more males had a 200, 400 and 600 day weight respectively compared to females (Figure 3). This trend is also seen across previous calving drops; in the 2012 calving year there were 6%, 6% and 9% more males with 200, 400 and 600 day weights on file, and in the 2013 calving drop there were 8%, 4% and 3% more males with 200, 400 and 600 day weights on file.

While this doesn't explain the differences in 200 and 400 day weights between the sexes, it is possible that the difference in the percentage of males and females with 600 day weights is due to producers not collecting 600 day weights on their pregnant heifers. Hereford breeders are reminded that they may collect 600 day weights on pregnant heifers that are less than 3-4 months pregnant. Where heifers are **more** than 3-4 months pregnant, 600 day weights may still be taken, but it is essential that:

1. Heifers are at a similar stage of pregnancy (maximum range 10 weeks).
2. Heifers have been pregnancy tested. If some heifers are pregnancy tested empty, and other pregnancy tested in calf, then breeders need to submit a management group along with the 600 day weights to subgroup the pregnant heifers from the empty heifers.



Figure 3. The percentage of female, male and all calves from the 2014 calving drop that have weight data recorded.

Mature cow weights (the live weight of the cow) can be collected on dams within two weeks of collecting a 200 day weight on their calves. However, in practice, most producers collect both Mature cow weights and 200 day weights on the same day. Mature cow weights are particularly important as they allow BREEDPLAN to identify curve bender animals (e.g. those animals that have above average growth, but moderate mature cow weights) which are desirable to many beef producers.

Just 13% of the dams of the 2014 calves had a mature cow weight recorded with BREEDPLAN (Figure 4). In contrast, 59% of the 2014 calving drop had a 200 day weight recorded (Figure 4). For those

producers that do collect 200 day weights but do not collect mature cow weights, running your dams over the scales at the same time as taking a 200 day weight on your calves will allow you to collect mature cow weight. These can then be submitted to BREEDPLAN along with the 200 day weights of the calves.



Figure 4. Mature cow weights on dams are collected at the same time as 200 day weights are collected on their calves. Here, the percentages of 2014 born calves with a 200 day weight, and the percentage of 2014 drop dams with a mature cow weight, are shown.

CARCASE TRAITS

The BREEDPLAN Carcase EBVS are calculated from two main sources of information – from live animal ultrasound scanning records measured by BREEDPLAN accredited ultrasound scanners and from abattoir carcase data. Seedstock producers are most likely to collect live animal ultrasound scanning information, while the majority of abattoir carcase data comes from animals in the Hereford Australia Progeny Test Project. The third section of the Completeness of Performance Report outlines the percentage of calves in each calving drop with ultrasound scan and abattoir data.

For the 2014 calving drop, 39% currently have ultrasound scan data (EMA, Rib Fat, Rump Fat or IMF) recorded with BREEDPLAN (Figure 5). While the percentage of 2014 born animals with ultrasound scan records is higher than previous calving drops (32% and 37% of the 2012 and 2013 calving drops respectively have scan data on file), less than half of the 2014 calving drop have ultrasound scan records.

Furthermore, when the percentage of male and female calves with ultrasound scanning records is examined, it is clear that more males (43%) than females (35%) have ultrasound scan records (Figure 5). This trend is consistent across years, with 29% of females and 39% of males in the 2012 calving drop having ultrasound scan records, and 34% of females and 40% of males in the 2013 calving drop having ultrasound scan records.

This disparity between the number of female and male animals scanned is of concern because ultrasound scan data on heifers is generally more valuable to the BREEDPLAN analysis than

ultrasound scan data on bulls. This is for two reasons; firstly, heifers generally mature earlier than bulls and thus display greater variation in the ultrasound scan traits at the time of scanning. Secondly, as many herds will often only scan a subset of their male calves (e.g. sale bulls), heifers will often represent a greater cross-section of the herd. Further information on the benefits of scanning heifers is available in the July 2016 SBTS & TBTS TechTalk article 'Scan Data for Heifers is Valuable'. This article is available from the SBTS website: <http://sbts.une.edu.au/pdfs/TTJuly2016.pdf>.

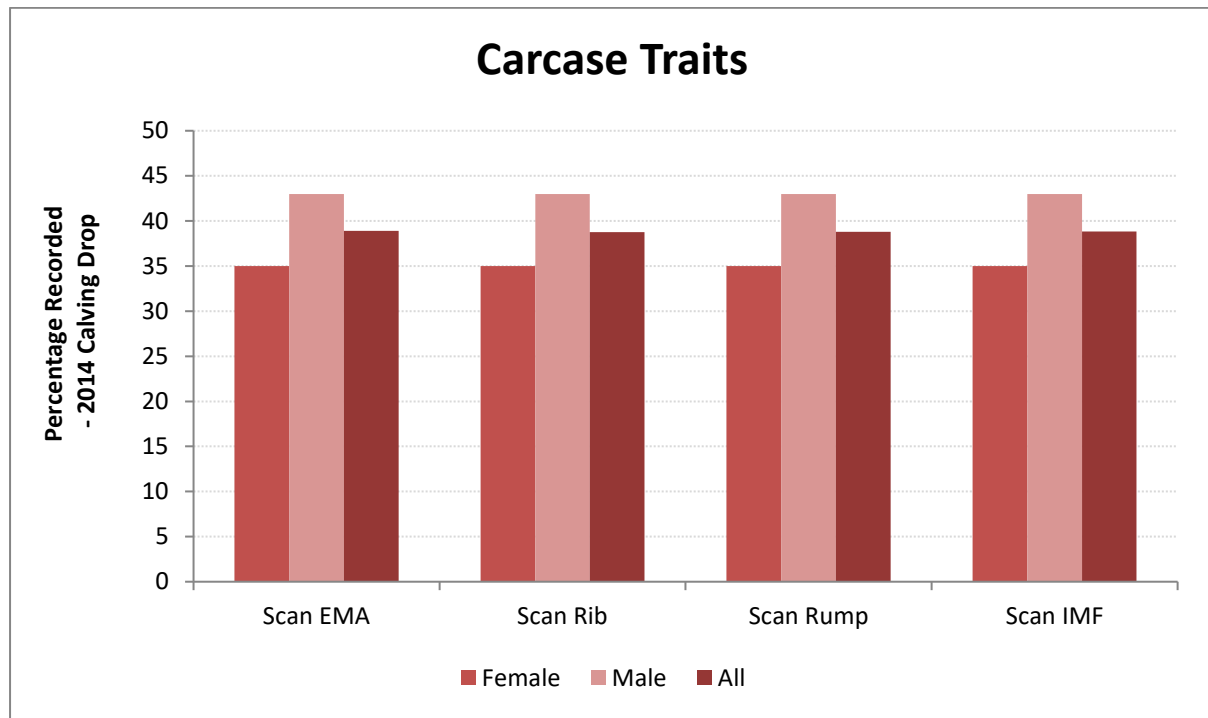


Figure 5. The percentage of female, male and all calves from the 2014 calving drop that have ultrasound scan data for the carcase traits (Scan EMA, Scan Rib, Scan Rump and Scan IMF) recorded.

BIRTH TRAITS

The Birth Traits section of the Completeness of Performance report outlines the percentage of calves in each calving drop which have calving difficulty scores, birth weight and AI dates on file. This data is used to calculate BREEDPLAN Calving Ease, Birth Weight and Gestation Length EBVs.

Of the 2014 calving drop, 66% of calves have calving difficulty scores on file (Figure 6). Slightly more male calves (69%) have calving difficulty scores on file compared to female calves (63%). The percentage of 2014 born calves with calving difficulty scores is slightly down on the 2013 calving year, where 69% of calves had calving difficulty scores. In contrast, the percentage of 2014 born calves with calving difficulty scores is slightly higher than the 2012 calving year, where just 63% of calves had calving difficulty scores. Please note that if you are checking your heifers and cows daily over the calving period, then any heifer and/or cow that calves without assistance between visits can be considered to have calved unassisted (calving difficulty score 1). Equally, if a Hereford breeder leaves the calving difficulty score blank, or records a '0', then this is interpreted as 'no score' rather than unassisted.

Of the 2014 calving drop, 56% had a birth weight on file (Figure 6). Once again, slightly more male calves (58%) had a birth weight compared to female calves (54%). The percentage of calves with birth weights has risen slightly in recent years, with 49% and 55% of calves in the 2012 and 2013 calving drops having birth weights recorded. While birth weight is a particularly important trait to

record for those that wish to identify curve-bender animals (those with a moderate birth weight and high growth at 200, 400 and 600 days of age), it is important to note that only birth weights that have been taken using scales should be submitted to BREEDPLAN. The methods used to collect birth weight can vary depending on what suits the Hereford producer. For example, sling and clock face scales, platform scales, commercial calf cradles and calf catchers with scales can all be used to measure birth weight. However, birth weights that have been guessed or estimated, or calculated using coronet band tapes should **not** be submitted to BREEDPLAN. This is because guesses, estimates and coronet band tapes do not accurately reflect the true birth weight of the calf. If you don't take birth weights using scales, then do not submit birth weights to BREEDPLAN.

For the 2014 calving drop, 99% of AI calves had an AI date recorded (Figure 6). There was no difference between the percentage of male AI calves and the percentage of female AI calves with AI dates on file. The percentage of AI calves with AI dates on file has increased compared to previous years; in the 2012 calving drop 72% of AI calves had an AI date on file and in the 2013 calving drop 88% of AI calves had an AI date on file.

Importantly, it should be noted that Hereford breeders do not need to be members of Hereford BREEDPLAN to submit birth trait data, as calving difficulty scores, birth weights and AI dates are supplied to Herefords Australia at the time of calf registration. All available calving difficulty scores, birth weights and AI dates are analysed in the BREEDPLAN analysis, even where the Hereford member is not a member of Hereford BREEDPLAN.

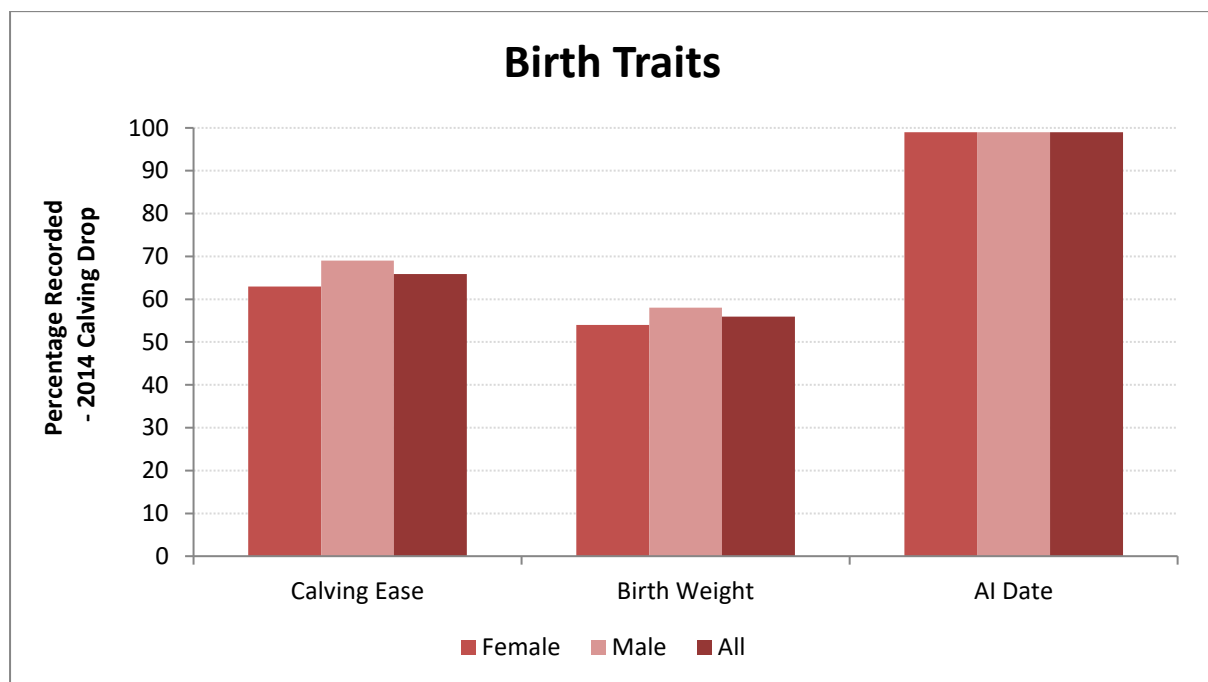


Figure 6. The percentage of female, male and all calves from the 2014 calving drop that have data for the birth traits (Calving Ease, Birth Weight and AI Date) recorded.

FERTILITY TRAITS

The Fertility Traits section of the Completeness of Performance report outlines the percentage of male calves in each calving drop which have scrotal circumference measurements on file. Just over a third of the male calves in the 2014 calving drop have scrotal size data on file, with 37% of the 2014 born male calves having a scrotal circumference measurement recorded. This is an improvement on

recent years, as 33% and 34% of the male calves from the 2012 and 2013 calving drops respectively have scrotal size data on file.

Many producers collect scrotal circumference records on their bull calves when taking either 400 day weights, or when collecting ultrasound scanning records on rising two year olds. BREEDPLAN recommends collecting scrotal circumference measurements when taking a 400 day weight. There are two reasons for this:

- Taking a scrotal circumference measurement at 400 days of age helps to identify those bulls which are already sexually mature, and those that are not. In contrast, if a scrotal circumference measurement is not taken until 600 days of age, then all of the bulls are likely to be sexually mature when the measurement is taken.
- Many producers would have more yearling bulls on the property than rising two year old bulls. Taking a scrotal circumference measurement at 400 days of age means that producers are more likely to be able to collect scrotal circumference measurements on a greater number of their young bulls.

It is important to note that scrotal circumference measurements **do not** need to be taken by an accredited technician or by a vet. Individual breeders may collect scrotal circumference measurements on their own bulls. However the use of a self-tensioning measurement tape is highly recommended. If you do not currently collect scrotal circumference measurements on your young bulls, then considering collecting scrotal circumference measurements when you bring the bulls in to measure 400 day weight.

The Fertility Traits section of the Completeness of Performance report also outlines the percentage of females with days to calving data in each year. For example, the percentage of females with days to calving information for 2014 does not show the percentage of 2014 born females with joining information, but the percentage of females of any age with joining information recorded in 2014. In 2014, just 8% of females of any age had joining information recorded. This is a reduction on previous years, with 10% and 11% of females having joining information recorded in 2013 and 2012 respectively.

Days to calving information could be considered one of the more involved BREEDPLAN traits to collect, with Hereford breeders who collect information for this trait needing to supply joining information on all females joined in the herd (i.e. 'bull in' and 'bull out' dates for all females), days to calving fate codes for any female that leaves the herd between joining and calving, and registering all resulting calves with Herefords Australia (including dead calves). It should also be noted that days to calving information will only be used in BREEDPLAN for females which have had natural joining only (i.e. if a cow has been through an AI program and then been out with a backup bull, her joining records cannot currently be used for the BREEDPLAN analysis). However, data for these females should still be supplied to BREEDPLAN, as AGBU will continue to use this data to investigate whether it can be incorporated into the BREEDPLAN analysis in the future. While the collection of days to calving data involves supplying multiple pieces of information, days to calving data provides valuable information on female fertility.

OTHER TRAITS

The Other Traits section of the Completeness of Performance report outlines the percentage of calves in each calving drop which have docility scores, structural soundness data and Net Feed Intake (NFI) data on file.

While Australian Herefords can be considered a “quiet” breed, there is still considerable genetic variation for temperament within the Australian Hereford. This is illustrated by the variation seen in the Docility EBVs; the current percentile bands (based on the 2015 calving drop) show a top value of +23% and a bottom value of -34% for Docility. Docility EBVs allow breeders to identify not just those animals which pass on good temperament to their progeny, but, perhaps most importantly, those animals which pass on poor temperament to their progeny.

Of the 2014 calving drop, 7% have a docility score on file (Figure 7). This percentage is similar to the 2013 calving drop, where 7.5% of calves have a docility score on file. However, this is an increase on the previous calving drops, with around 4% of calves in the 2009, 2010, 2011 and 2012 calving drops having a docility score recorded. In the 2014 calving drop, there were more male calves with a docility score recorded, with 8% of male calves versus 6% of female calves having a docility score recorded (Figure 7).

Structural Soundness EBVs are not currently published for Herefords. This is because a minimum number of records is required before a new trait can be introduced in a breed, and there are not yet sufficient structural soundness records for Herefords to allow these EBVs to be calculated. However, structural soundness data can still be collected by Hereford breeders and submitted to BREEDPLAN (where it will be stored on the database). As with any trait, if the data is never collected, then EBVs can never be produced for that trait. In the 2014 calving drop, 1% of calves had structural soundness data recorded (Figure 7). This is very similar to previous calving drops, with 1% of calves in the 2012 and 2013 calving drops also having structural soundness data recorded.

Net Feed Intake (NFI) EBVs are published for Herefords; however, very few NFI records are collected. This is because collecting NFI data requires both specialised equipment and is very costly (each animal will spend a minimum of 91 days on feed during both the pre-test adjustment period and the test period itself). Consequently, NFI is a trait that is not routinely collected on farm and is instead usually only collected in structured progeny test programs such as the Hereford BIN. Indeed, the majority if not all of the NFI data that has come on file in recent years will be from steers in the Hereford BIN. In the 2014 calving drop, just 0.2% of calves had NFI data recorded (Figure 7).

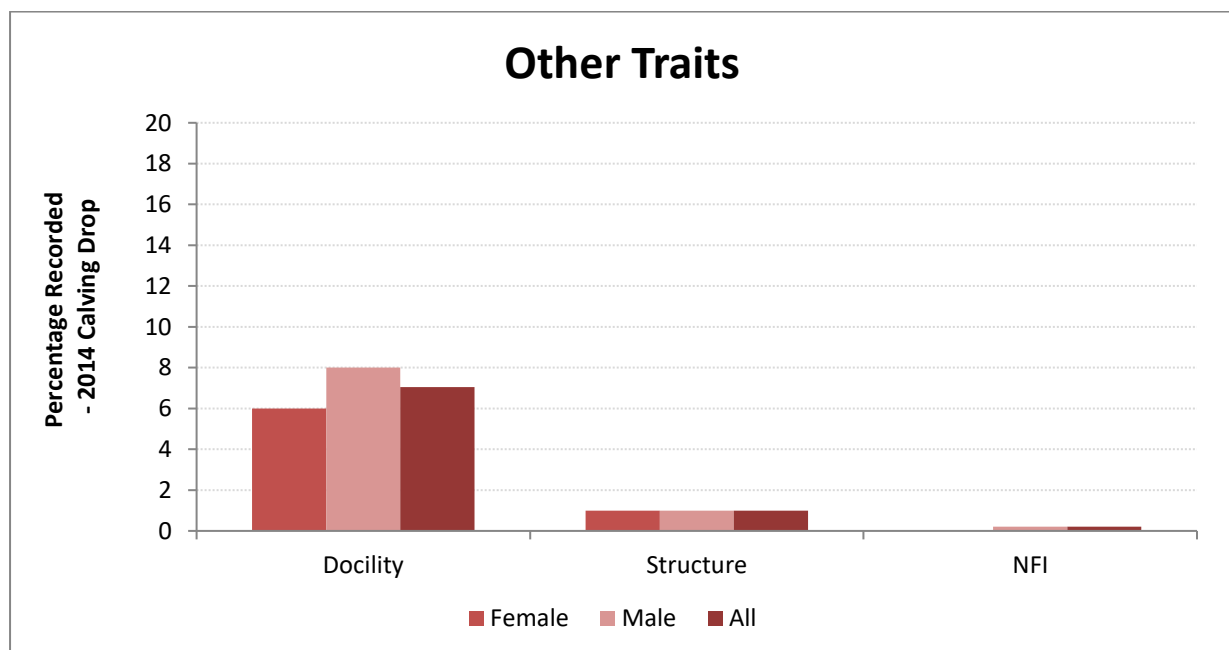


Figure 7. The percentage of female, male and all calves from the 2014 calving drop that have data for the other traits (Docility, Structure and NFI) recorded.

LESSONS FROM THE HEREFORDS AUSTRALIA COMPLETENESS OF PERFORMANCE REPORT

What lessons can Hereford breeders learn from examining the Completeness of Performance report for the breed as a whole? One thing which the Completeness of Performance report has highlighted is that across most traits, the consistent trend is that a greater percentage of male calves have performance data for a trait than do female calves. How can this be addressed?

Firstly, the importance of collecting performance data for female calves cannot be understated. In many operations, a larger percentage of female calves are retained than male calves. Thus, particularly for traits measured later in the animals life (e.g. traits measured when the animals are yearlings or rising 2 year olds), the female cohort will likely represent a greater proportion of the variation present within the herd. In addition, for some traits, such as the ultrasound scan traits, female calves should exhibit greater variation than male calves at the same age. Given that variation between individual animals is essential in the BREEDPLAN analysis, females provide very valuable data for the BREEDPLAN analysis. Thirdly, given that information collected on relatives is used in the calculation of a relative's EBVs, performance information collected on females will contribute to the EBVs of their sires (and dams) and to other male relatives such as full-brothers and half-brothers.

Wherever possible, therefore, Hereford breeders should aim to collect the same performance data on their female calves as they do on their male calves. In situations where Hereford breeders have heifers that calve at 2 years of age, it should be noted that both 600 day weights and ultrasound scan data can be collected on pregnant heifers. If your situation requires you to do this, then it should be noted that it is preferable to collect performance information on pregnant heifers that are less than 3-4 months pregnant. If heifers are more than 3-4 months pregnant, then performance data can still be collected, but heifers need to be at a similar stage of pregnancy. Therefore, where pregnant heifers are more than 3-4 months pregnant, heifers that were preg-tested empty should also be put into a different management group to those which were preg-tested in calf.

The Completeness of Performance report has also given a snapshot of the level of performance recording within the breed, and, as expected, there are some traits which are better recorded than others. While this is not unexpected, and is seen consistently not just in Herefords but across breeds, there are a number of things which Hereford producers should consider which may help to increase the percentage of calves for which they can collect performance information. These are highlighted below:

1. Remember that 200 day weights can be recorded when the calf is between 80-300 days of age, 400 day weights can be recorded when the calf is between 301-500 days of age, and that 600 day weights can be recorded when the calf is between 501-900 days of age. Producers who have calves which leave the system before 200, 400 or 600 days of age should try to take a weight on all animals before culling a proportion of calves. For example, if you sell a number of animals as yearlings, then take an early 400 day weight on all animals before a subset leave the property (e.g. weigh all calves when they are approximately 350 days of age, rather than waiting until the calves are 400 days of age when a number have already been sold).
2. Mature cow weights should be collected when you are collecting 200 day weights on the cow's calf. For those Hereford producers who collect 200 day weight but not mature cow weight, run your cows over the scales when you collect 200 day weights on the calves, and submit these cow weights to BREEDPLAN.

3. One way to increase the percentage of animals with ultrasound scan data is to scan not just sale bulls, but all of the rising 2 year old bulls still on the property. Scanning females will also increase the percentage of animals with ultrasound scan data, and, as already discussed, will provide the BREEDPLAN analysis with really valuable data.
4. Scrotal circumference measurements are currently only collected on about one third of the male Hereford calves born in each calving year. Scrotal circumference measurements can be collected by the producer (no accredited technicians or vets required), so there is nothing to stop all Hereford producers from collecting scrotal circumference measurements. In addition, collecting scrotal circumference measurements at a younger age (e.g. 400 days compared to 600 days) should allow Hereford producers to collect scrotal circumference measurements on more young bulls.
5. Docility scores are routinely collected on less than 10% of the entire Hereford calving drop. While Herefords are a 'quiet' breed, there is considerable variation in temperament. Docility scores should be collected at around weaning time, before animals have had considerable handling. Hereford breeder should consider collecting docility scores when also collecting 200 day weights and mature cow weights at weaning time.

Examining the Completeness of Performance report for the Hereford breed as a whole allowed the percentage of male to female calves that are recorded each year to be examined. While the percentage of male to female calves is expected to fluctuate each year (e.g. a 50:50 split of calves is not expected for each calving year), it is expected that in some years there will be more male calves than female calves, and that in other years there will be more female calves than male calves. However, this is not the case in the Hereford breed, with more female calves having been registered than male calves for each calving year between 2002 and 2016. The observed situation may indicate that some breeders are selectively registering more female calves each year than they are male calves (i.e. all female calves are registered but only a subset of male calves are recorded).

The bigger implication of this is of course selective recording – where only a subset of calves from the whole herd are recorded, BREEDPLAN can only compare the performance of each calf to the group that is recorded, not to the whole cohort. As a result (particularly if only the 'good' calves are recorded), the resulting EBVs can be biased. Therefore it is important that Hereford breeders register all calves that are born each calving year (as well as recording performance data for all available calves rather than just a subset).