AUSTRALIAN WAGYU ASSOCIATION™

WAGYU TECHNICAL UPDATE

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WHAT HAPPENED TO SHIGESHIGETANI'S MARBLE SCORE EBV?

WKSFP1593

An animal's breeding value can be defined as its genetic merit for each trait. While it is not possible to determine an animal's true breeding value, it is possible to estimate it, and these are called Estimated Breeding Values (EBVs).

EBVs are reported in the units in which the measurements are taken (e.g. marble scores for the Marble Score EBV). Thus, a Marble Score EBV of +1.6 means the animal has been estimated to be genetically superior by 1.6 marble score units when compared with another animal with a marble score EBV of zero.

On average, half of this difference will be passed on to the animal's progeny.

The individual EBVs for animals can change slightly from run to run as additional data (genotypes and phenotypes) are added to the analysis. Occasionally, larger amounts of performance data are provided by AWA members and these can result in significant changes in EBVs. These changes are data driven.

This article will focus on one such recent change, involving the already 'proven sire' WKSFP1593 (World K's Shigeshigetani 1593).

In the September 2020 BREEDPLAN run, a total of 54 carcase progeny records were already loaded for WKSFP1593.

He had a Marble Score EBV of +1.1 with an accuracy of 81%. Prior to the October 2020 BREEDPLAN run, an additional 46 carcase records were added from WKSP1593. The result was that his Marble Score EBV increased to +2.1 with an accuracy of 89%.

No additional progeny carcase data related to WKSFP1593 has been added since October 2020, so his carcase EBVs remain the same.

USING PROGENY PERFORMANCE TO EBVS

The statistical models used by BREEDPLAN to calculate EBVs use several important sources of data to calculate EBVs:

- The relationships between all animals
- Genomic information (genomic SNP results)
- Progeny performance in contemporary groups
- The heritability of the traits
- The genetic correlation with other traits

SHIGESHIGETANI'S **WKSFP1593** MS EBV

To keep this explanation relatively simple, we will only look at one source of data "Progeny performance in contemporary groups" and only Marble Score as the trait of interest.

The graph in Figure 1 shows the carcase marble scores of all animals in the groups in which WKSFP1593 also had progeny, represented by the red dots. There are several instances where dots overlap and, in those cases, the red dot will be shown while the black dot will be hidden.

In all graphs the blue line represents the group average, therefore; any dot above the line is an indication of above average marble scores within each group.

Figure 1 shows the majority of WKSFP1593's progeny has marble scores higher than the average of each contemporary (kill) group. It is important to remember that each of the progeny got half of their genetics from their sire and the other half from their dam. The dam's genetic merit will therefore impact the marble scores displayed in Figure 1.

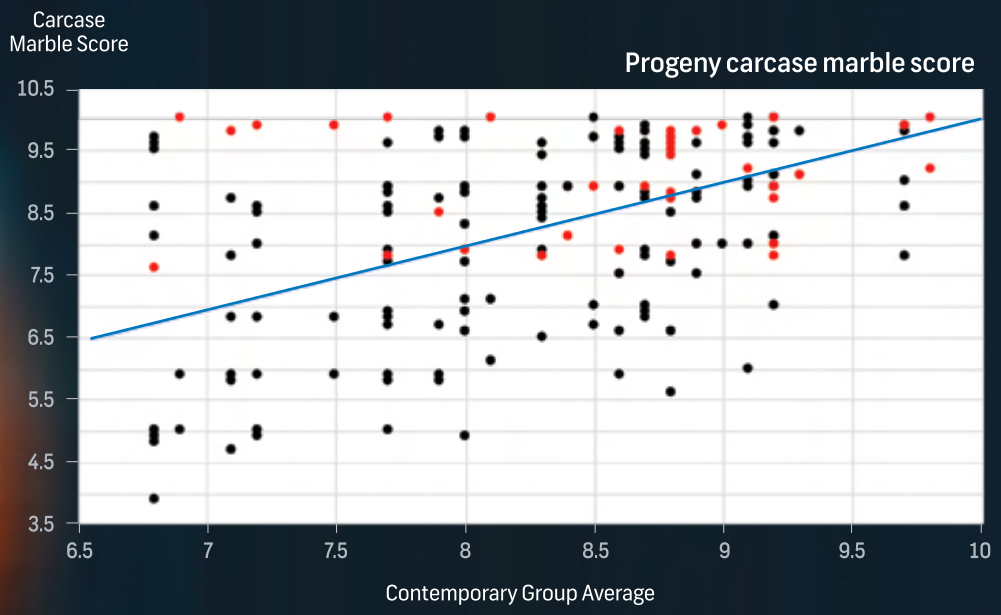


FIGURE 1
Shigeshigetani (red) compared to contemporaries for marble score.

PROGENY OF OTHER SIRES
PROGENY OF WKSFP1593
GROUP AVERAGE

In addition to individual progeny marble score records, the BREEDPLAN statistical model also considers the averages of the progeny of each sire in the group and use this information to benchmark different sires. To demonstrate this principle, the sire group averages are shown in Figure 2.

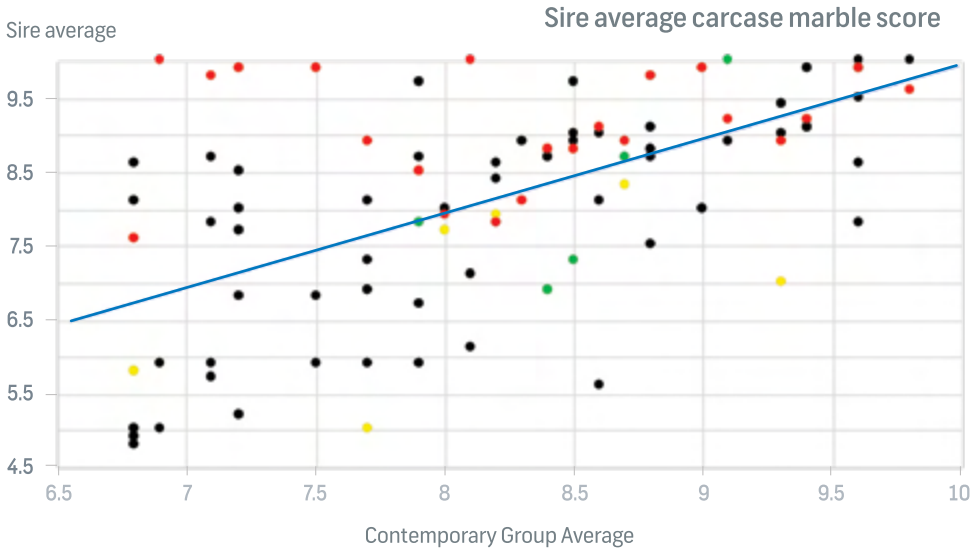
To reduce the complexity, three sires are represented by different colour dots. Two well know industry AI sires (WKSFM0164 and let's call him Sire 1) also had progeny which can be compared to WKSFP1593's progeny.

The purpose of comparing the progeny of these sires are purely to help explain how BREEDPLAN uses marble score data to calculate the MS EBVs and not to determine the "usefulness" of the bulls to the Wagyu industry.

Figure 2 shows that the progeny of WKSFP1593 have significantly higher marble scores than the progeny of Sire 1. Also, in most cases where WKSFP1593 and WKSFM0164 progeny can be compared (in the same groups) the average marble scores of WKSFP1593's progeny are higher than that of WKSFM0164. These differences are also reflected in the current MS EBVs of the three sires which are +2.1 (accuracy 91%), +1.4 (accuracy 98%) and -0.4 (accuracy 94%) for WKSFP1593, WKSFM0164 and Sire 1 respectively.

FIGURE 2
Sire average marble scores for three well known sires.

OTHER SIRES
WKSFP1593
WKSFM0164
SIRE 1
GROUP AVERAGE



ANOTHER EXAMPLE WHERE A SIRE'S MS EBV DECREASED

When new data is loaded into the Wagyu BREEDPLAN analysis, the EBVs of some animals move up, while those of other animals may move down. Figures 3 and 4 are examples where due to additional carcase data, a sire's MS EBVs decreased by almost a whole marble score. In this case, we will refer to the sire of interest as Sire A and the other reference sires in the group as Sire B and Sire C.

Figure 3 shows the carcase marble scores of all animals in the group in which Sire A had progeny, his progeny records are represented by the pink dots. As in the previous graphs, where dots overlap the pink dots will be shown while the black dots will be hidden.

The figure shows, while there are some of Sire A's progeny above the group average, most of his progeny are below the group average. To again highlight the differences in progeny performance, Figure 4 shows the sire's group averages and three sires are represented by different colour dots.

In Figure 4, in all instances, the averages of the progeny of Sire A are below the group average while the averages of the progeny of Sire B are all above the group average. In most cases the progeny averages of Sire C are higher or close to that of Sire A but lower than Sire B.

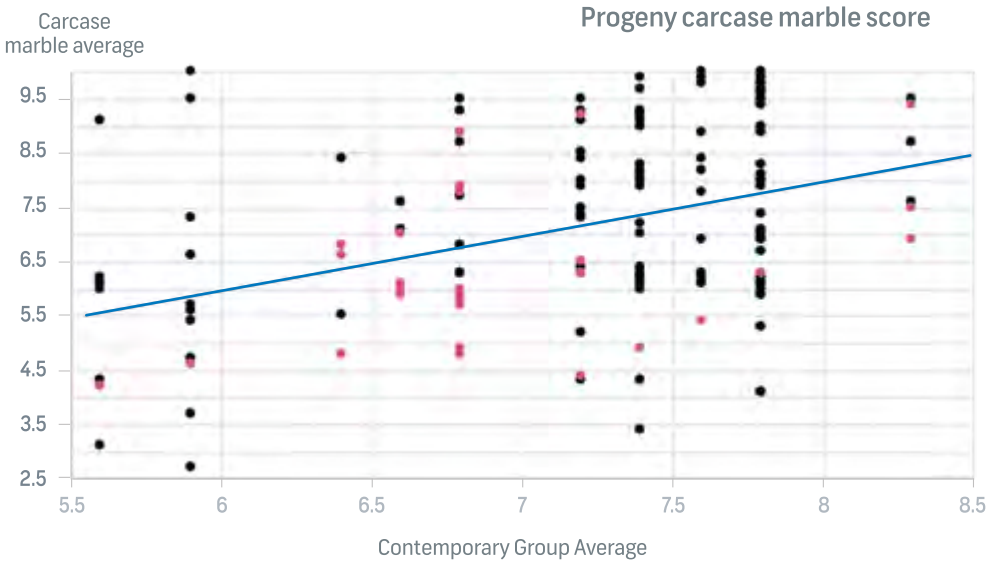


FIGURE 3
Marble score of Sires A (pink), B and C compared to the group average.

PROGENY OF OTHER SIRES
PROGENY OF SIRE A
GROUP AVERAGE

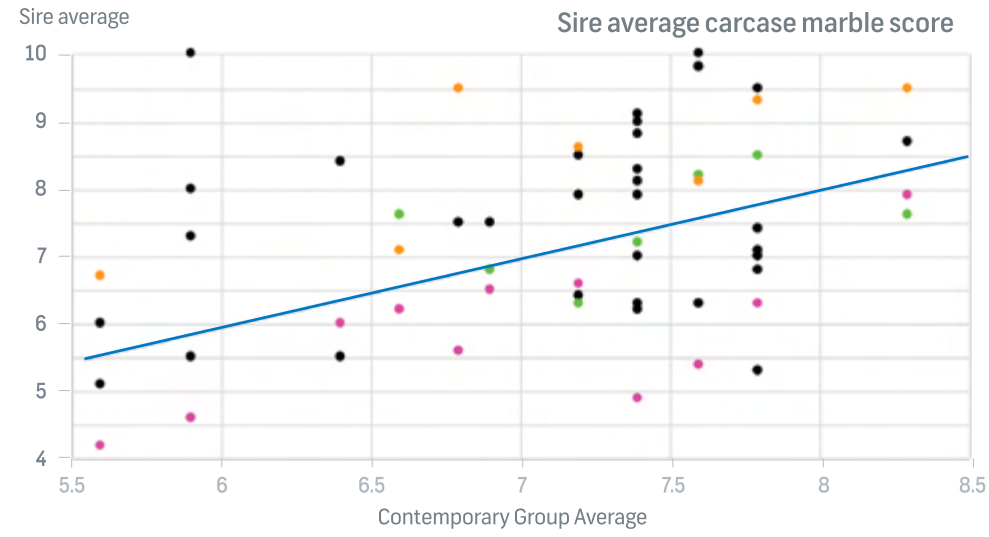


FIGURE 4
The averages of the progeny.

OTHER SIRES
SIRE A
SIRE B
SIRE C
GROUP AVERAGE

The EBVs, accuracies and number of marble score records before and after analysis are shown in Table 1.

The table demonstrates that the MS EBV movement for the three sires are in line with the carcase marble score performance of their progeny where Sire A decreased, Sire B increased and Sire C stayed the same.

These two examples clearly demonstrate that BREEDPLAN use progeny records (from groups where more than one record and more than one sires are represented) to calculate the differences in the genetic merit of sires.

TABLE 1

SIRE	ANALYSIS	MS EBV	MS ACC	MS RECORDS
SIRE A	Before	+0.1	59%	0
SIRE B	Before	+0.9	90%	100
SIRE C	Before	+0.3	88%	51
SIRE A	After	-1.1	85%	41
SIRE B	After	+1.6	92%	140
SIRE C	After	+0.3	90%	71

USING EBVs TO PREDICT PROGENY PERFORMANCE

BREEDPLAN uses performance data to calculate the differences in genetic merit for the respective traits and therefore be used to predict the difference in performance that will be observed if two or more sires are used and their progeny fed under the same conditions until slaughter.

To demonstrate this, we can do a simple theoretical comparison between two bulls. The first bull has a Marble Score (MS) EBV of +2, while the second bull has a MS EBV of -1. Comparing these animals shows a difference in MS EBV of 3. Assume these sires are randomly mated to cows with similar MS EBVs (similar genetic merit for marble score). Half the genetics of a calf comes from its sire and the other half from its dam. As the dams (in this example) are of similar genetic merit, observed differences would be expected to be a result of the differences between the sires.

We can estimate that calves from the first bull would have (on average) marble scores that are 1.5 units higher than calves of the second bull.

This example is only valid if the calves are managed and killed at a level where they can express this genetic variation.

MORE INFORMATION

Contact the Australian Wagyu Association for further information or if you wish to republish any part of this article

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