THE AUSTRALIAN WAGYU UPDATE™

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TEN YEAR TRENDS IN THE WAGYU SECTOR

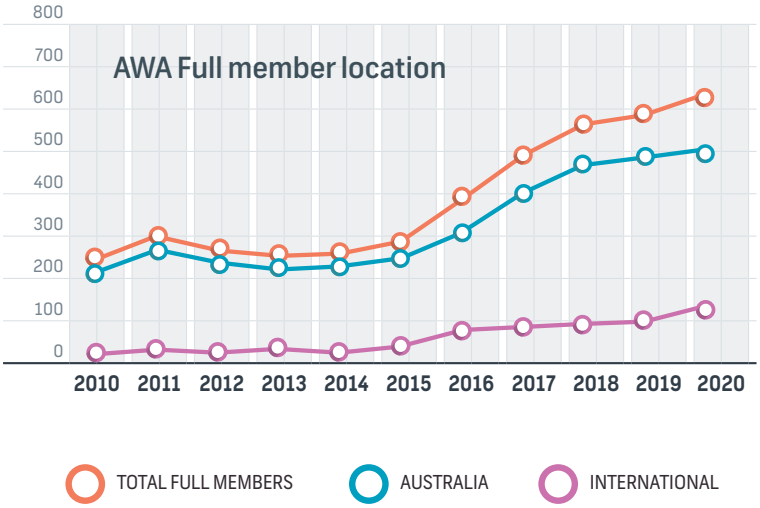
PART 1 MULTI-TRAIT GENETIC IMPROVEMENT

The AWA has grown significantly over the 2010 - 2020 period as a result of a substantial increase in the number and scale of its members operations.

This analysis provides feedback to members on how their contributions have impacted the genetic evaluation for Wagyu cattle and to report some of the observed breeding trends.

FIGURE 1

Membership trends across for the AWA over the past ten years up until 20 June 2020.



GROWTH IN MEMBERSHIP & REGISTERED ANIMAL NUMBERS

The power of a genetic evaluation is influenced by the number of people who use it, the number of animals involved and the strength of the data that is analysed.

Since 2010, the number of Full AWA members has increased three-fold to 633 (20 June 2020, Figure 1). This growth has occurred since 2015, with an increasing proportion of new AWA members being international Full members who register animals with the AWA, to provide genomic information and performance records into the Wagyu BREEDPLAN genetic analysis.

Over the five-year growth period from 2015 – 2020, the number of registered dams (females with recorded progeny in the AWA Herdbook) has increased more than two-fold to 104,222 (refer to Figure 2; orange line, page 2).

AWA members typically only register a portion of their calves, mostly out of the 50% that are females. Comparing the orange (dam) line in Figure 2 to the blue and purple (calves) lines, approximately 25% of dams had calves registered against them by the AWA in 2015. As the registered number of dams has increased, there is an increase in registration of new calves, of which approximately 80% are females and therefore, future breeders. The number of sires (males with recorded progeny – refer to Figure 2; green line, page 2) increased 2.6-fold over the same period to 12,224.

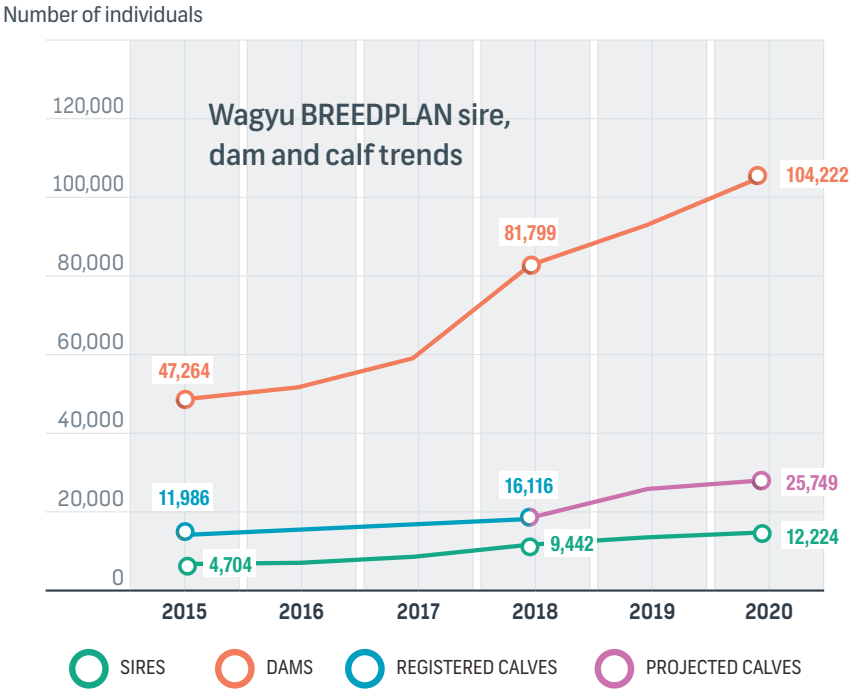


FIGURE 2
Total registered sires, dams and calves between FY2015 to FY2020 for which BREEDPLAN EBVs are provided.

DATA RECORDING TRENDS – GENOTYPE AND PHENOTYPE

The Wagyu genetic analysis is based on three components, a pedigree recording platform (the AWA Herdbook described page 1), phenotypic records (animal performance data for traits supplied by members) and genotype records (genomic data supplied by members). Using these sources of information, Wagyu BREEDPLAN uses statistical analysis to calculate the genetic merit of individuals using all available data.

Wagyu BREEDPLAN analysis provides EBVs for all dams, sires and calves registered with the AWA, including those from members in more than 20 countries. The analysis uses approximately 60,000 genomic records and an increasing volume of performance records (Figure 3).

Since 2015, the number of AWA members who are BREEDPLAN members and submit performance data has increased 280% from 43 members, to 120 members. These members are located across nine different countries on four continents.

In the past five years there has been a steady increase in recording across the major growth performance traits. Records for birthweight have increased 70% to 35,419 total records, 200-day weight (weaning weight) has increased by 95% and 600-day weight has increased by 85%.

In the same period, a total of 47 AWA members submitted carcase data records to the AWA, with carcase weight and marble score records increasing by 370% and 400% respectively to approximately 10,000 records for each (to 30 June 2020).

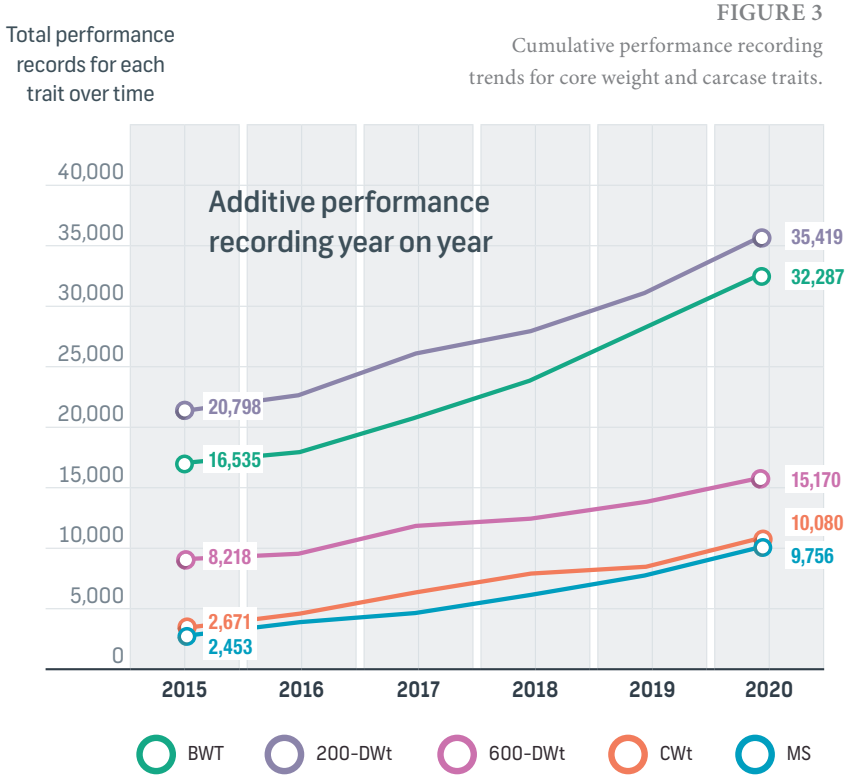


FIGURE 3
Cumulative performance recording trends for core weight and carcase traits.

ACCURACY TRENDS – THE RELIABILITY OF THE ANALYSIS

As more members are submitting more phenotype records and undertaking large numbers of genomic testing on their herds, the impacts of these factors on the accuracy of genetic prediction for traits within the Wagyu BREEDPLAN analysis is evident.

Shown in Figure 4 are the whole-of-database, average accuracies for the core growth and carcase traits since 2015. AWA switched to include genomic information for registered animals in 2018 with the introduction of Single-Step BREEDPLAN. The large jump in whole-of-database accuracy for BREEDPLAN EBVs can be seen between 2017 and 2018.

As shown in Figure 4, the impact of new genomics information and performance data is spread across the whole of the AWA Herdbook and has a gradual positive influence on increasing accuracies. In the five years to 2020, the whole-of-database average EBV accuracy has increased 5%. The largest impact of new genomic and performance data is on 'current' or newly registered animals as shown in Figure 5 (see page 4).

It is worth noting the significant jump in accuracy for the EBVs of calves born in 2017, most of which were registered in 2018 post the implementation of Single-Step BREEPLAN. These calves benefited from the addition of genomic information within the BREEDPLAN analysis.

The overall trend for EBV accuracy for newly registered calves has been a substantial increase from an average of 47.5% for calves registered in 2015, to 61.5% for calves registered in 2020. This is an increase in EBV accuracy of 14% during the five-year period to 2020. The average accuracy of growth traits EBVs is now greater than 65% for 2020 born calves, with accuracy for carcase traits ranging from 50% (EMA) to 60% (CWt).

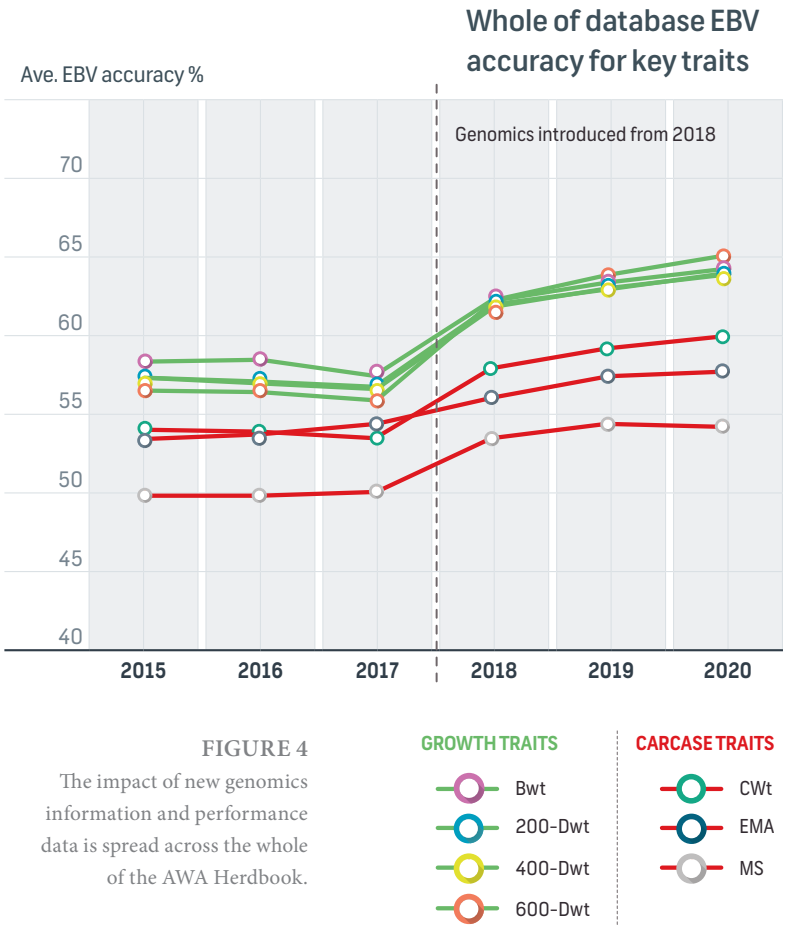


FIGURE 4
The impact of new genomics information and performance data is spread across the whole of the AWA Herdbook.

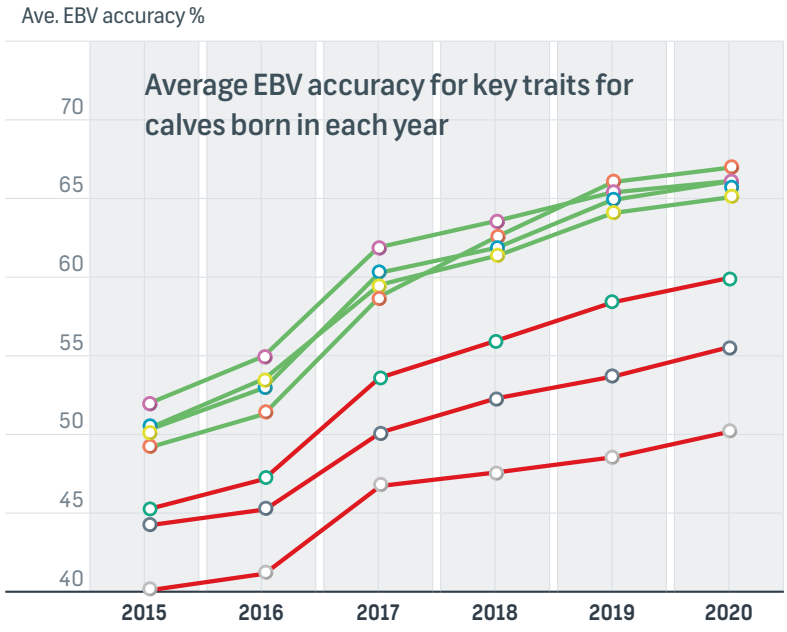


FIGURE 5
The average accuracies for core growth and carcase traits for calves born each year since 2015.

Genetic change can be demonstrated in all key growth and carcase traits – demonstrating that as a collective, Wagyu breeders have categorically not focused on single trait selection and have made sustained improvements through multi-trait breeding.

MULTI-TRAIT SELECTION

Every breeder has their own breeding objective for their herd. Whilst there is no doubt that Wagyu are identified as 'the marbling breed', our Wagyu breeder members are cattle producers and manage herds of females that are required to perform in a wide range of different environments from northern Queensland to Tasmania and Western Australia.

The following section demonstrates continued improvement (genetic gain) across a range of growth and carcase traits.

GENETIC TRENDS – GROWTH

To understand genetic trends across the whole Wagyu herd, it is necessary to look at changes over a longer time frame, as genetic progress is gradual and cumulative. The following figures show trends over a ten year period, looking at the average EBVs for traits of calves born within a year.

In Figures 6 and 7, the trends for early life growth (birth weight) and weaning weight (200- day weight) shows slight increases across the last ten year period. The average Birth Weight EBV is increasing at 0.03kg per year, such that over the ten years to 2020, the average Birth Weight EBV has increased +0.3kg to +1.1.

As shown in Figure 6, the slight trend towards increase in Birth Weight EBV is associated with +5kg increase in Mature Cow Weight EBV (Figure 9) over the same period. Hence, as genetic potential for birth weight is increasing, genetic potential for cow size is also increasing. However, care should always be taken in matching Birth Weight EBVs of sires to the frame size of cows and breeders should consider the Birth Weight EBVs of their breeding females to avoid matching high birth weight sires to high birth weight females.

For 200-day weight, the EBV is increasing at +0.08kg per year, such that over the ten years to 2020, the average 200-Day Weight EBV for calves has increased +0.8kg to +9.6kg.

FIGURE 6
Average Birth Weight EBV for calves born in each year.

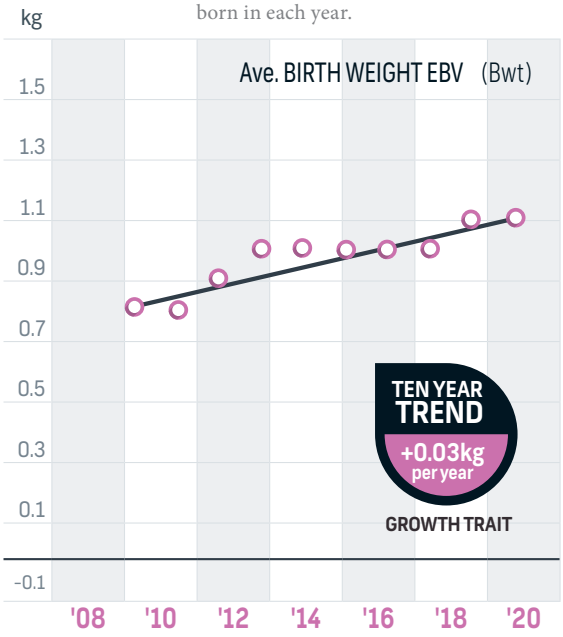


FIGURE 7
Average 200-Day Weight EBV for calves born in each year.

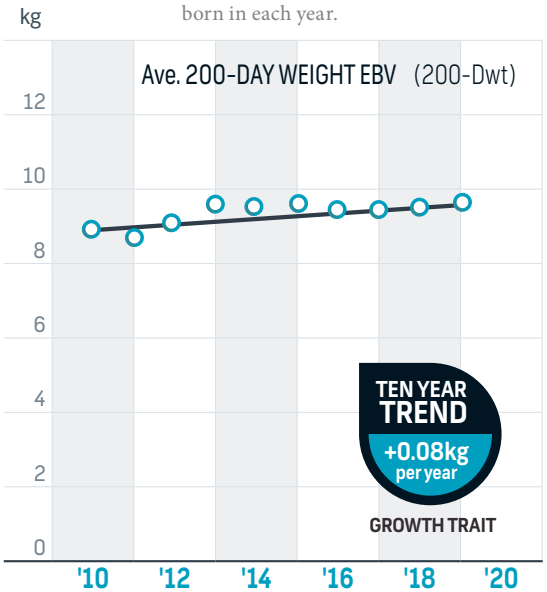


FIGURE 8
Average 600-Day Weight EBV for calves born in each year.

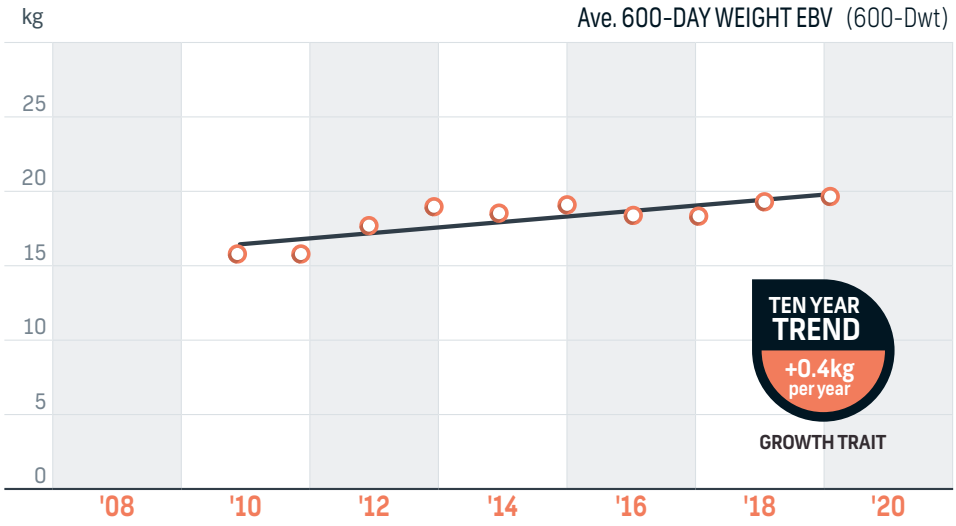
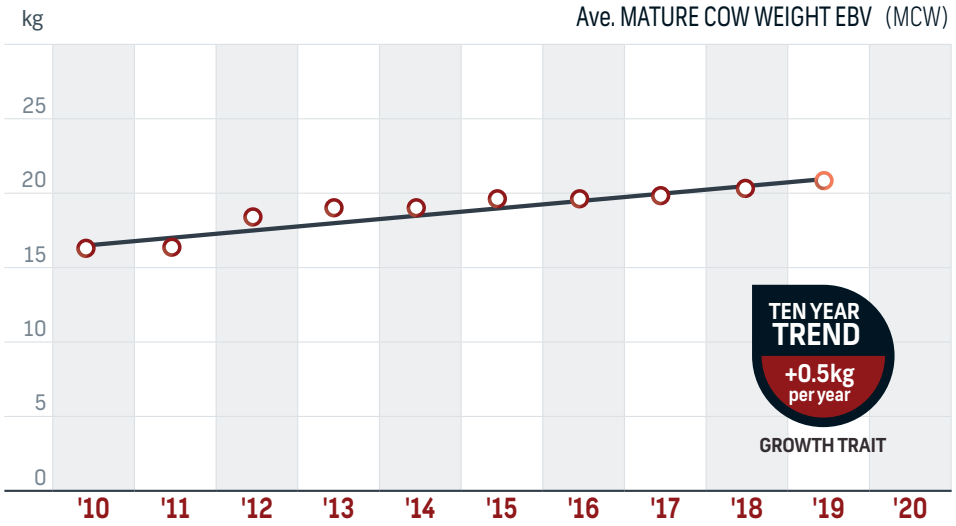


FIGURE 9
Average Mature Cow Weight EBV for calves born in each year.



In Figures 8 and 9, the trends for later life weight gain, 600-day weight and mature cow weight, also show increases across the last ten year period.

The average 600-Day Weight EBV is increasing at +0.4kg per year. Over the ten years to 2020, the average 600-Day Weight EBV has increased 4kg to +19.2kg.

Likewise, for mature cow weight, the genetic potential has increased by 5kg over the ten year period to +20.6kg.

GENETIC TRENDS – CARCASE

Similar to increases across growth traits for the past ten years, AWA members have made significant progress in genetic merit for core carcase traits (Figures 10 - 12).

Consistent with increases in 600-day weight and mature cow weight, genetic gain in the Carcase Weight EBV (Figure 10) has averaged +0.5kg per year, resulting in a 5kg increase in Carcase Weight EBV to +15.3kg.

In addition to the genetic gain for growth and carcase weight over the ten year period, genetic gain for marble score has been significant. The ten year trend for the Marble Score EBV (Figure 11) is an increase of +0.04 MS units per year. This amounts to a +0.4 MS EBV increase over the past ten years to +0.8.

There is significant and positive genetic correlation between marble score and eye muscle area in Wagyu. As the genetic potential for deposition of intramuscular fat within the eye muscle increases, the genetic potential for eye muscle area also increases.

Figure 12 shows the ten year trend for increasing Eye Muscle Area EBV at +0.07 sq cm per year, amounting to an increase of +0.7 centimeters over the last ten years to +1.2.

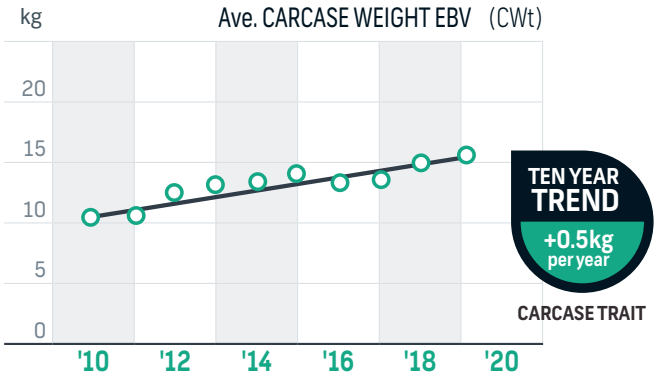


FIGURE 10
Average Carcase Weight EBV for calves born in each year.

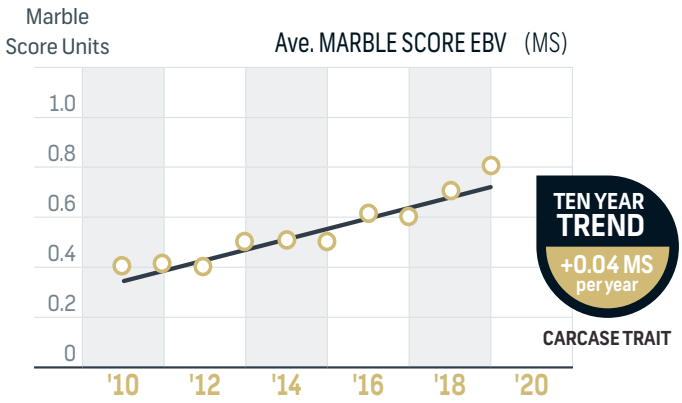


FIGURE 11
Average Marble Score EBV for calves born in each year.

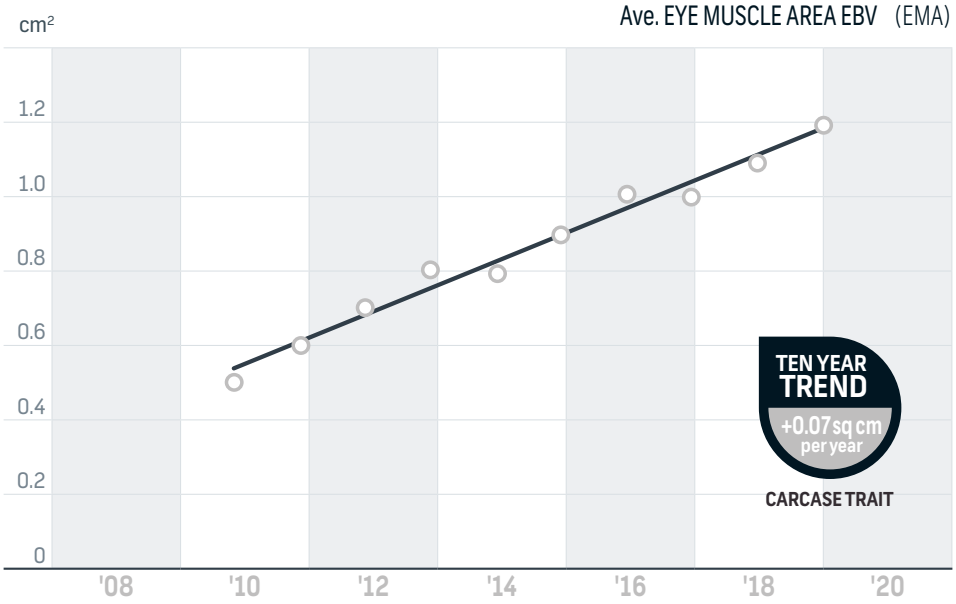


FIGURE 12
Average Eye Muscle Area EBV for calves born in each year.

> “ AWA members have made significant genetic progress across all traits reported without bias toward a particular trait.

MAKING SENSE OF GENETIC INFORMATION

It is important to note that the EBVs reported by AWA through Wagyu BREEDPLAN reflect the breeding directions of the membership as a whole. It has demonstrated in the information presented, that AWA members have made significant genetic progress across all traits reported without bias toward a particular trait. The total analysis shows a consistent trend toward increasing genetic merit of growth and carcase traits, demonstrating effective multi-trait selection.

It is encouraging to note the substantial increase in EBV accuracy for newly registered calves in the past five years. This trend is significant, with the contribution of performance data and genomic information resulting in substantial lift in accuracy for all growth and carcase traits recorded.

The higher accuracy for growth traits reported is largely a reflection of the increased volume of performance data for those traits. As more members become Wagyu BREEDPLAN data submitters and increased volumes of performance data is provided, it's likely accuracy trends and genetic merit will increase across the herd.

Likewise, as EBV accuracy increases, it becomes easier for members to make genetic gain by more accurately identifying genetic merit within their herds.