

New Expression of Type ABVs

Technote 2

HIGHLIGHTS

- Type ABVs are standardised so it is easier to decide if an animal is superior for a specific trait.
- Type ABVs are expressed on a common scale where one standard deviation is set to 5 and the average is 100.

New expression of Type ABVs

From April 2015, the expression of Type ABVs and the definition of 'average' is changing to be more consistent with the way in which breeding values are expressed in other countries. This fact sheet describes the new expression of Type ABVs.

Comparing ABVs

Australian Breeding Values (ABVs) are a relative measure of an animal's genetic merit. A single ABV figure doesn't mean much unless it's compared to another animal or an average.

We can use the analogy of a car where:

- The size of the fuel tank is an absolute measure. For example 60L tank.
- But safety rating is measured in stars and you don't know if a '3 star rating' is good or bad until you compare it to another car, an average, or a top score. A star rating is a relative measure.

ABVs, like car safety ratings are relative measures. To make sense of a relative measure, it is useful to understand the average of each ABV and how the ABVs are expressed.

Definition of 'Average'

The 'average', also known as the 'base' is a clearly defined group of animals to which all others are compared.

Around the world, countries will use different groups of animals as their 'average'.

In Australia, average is cows of the same breed that are 6 years +/- 2 years of age. For example, in 2015, the average includes cows born between 2007 and 2011.

The average of this group is set to 100 and provides a reference point for comparisons between ABVs for both cows and bulls.

The average is updated each year so that it stays current and is a reflection of the cows that are milking around Australia, today.

Standard Deviations

A standard deviation is a statistical term that describes how much spread there is in a set of numbers.

- The size of a standard deviation is small if there isn't much variation in the numbers.
- The size is larger if there is greater difference in the spread of the information from best to worst.

In the case of animal performance, there are usually lots of animals that are about average and fewer animals that are extreme (either extremely bad or extremely good). This is a normal distribution pattern of data which is illustrated in Figure 1.

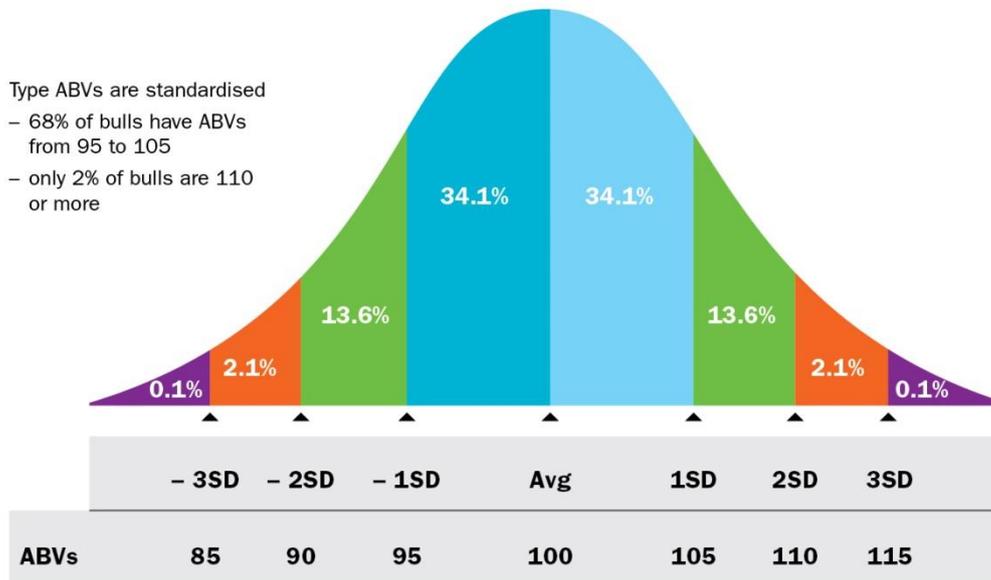


Figure 1: Normal distribution curve showing the proportion of a population expected in each standard deviation.

In a normal distribution;

- One third of animals will be within 1 standard deviation above average and another third below average.
- A smaller number (27%) will be between 1 and 2 standard deviations,
- A very small number (4%) will be between 2 and 3 standard deviations, and

The size of the standard deviation depends on how much difference exists between the best and worst groups of animals. To apply this to dairy cattle breeding, the trait of Rear Leg Set is a good example. There isn't much difference between best and worst. In fact, the standard deviation is about 5 whereas Stature has more than double the size of a standard deviation (11 for Holsteins).

If you know the size of the standard deviation, it's easy to figure out if an animal is average, a bit above average or extreme for a trait.

Standardising ABVs

From April 2015, Type ABVs are 'standardised'. The size of the standard deviation for all type traits is set to 5. In doing so, one standard deviation is 5 units; two SD is 10 units and so on. So what does this mean?

- A bull with an Stature ABV of 100 will be average for the trait
- A bull with an Stature ABV of 105 will be 1 SD taller than average
 - (in the top ~16% for the breed)
- A bull with an Stature ABV of 95 will be 1 SD shorter than average
 - (in the bottom ~16% for the breed)
- A bull with an Stature ABV of 110 will be 2 SD taller than average
 - (in the top ~2% for the breed)
- A bull with a rear teat placement ABV of 110 will be 2SD closer than average

Future research

Type ABVs are the focus of current research programs which will help us understand changes in type data over time.

For more information

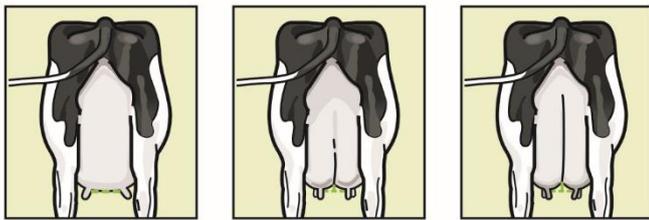
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Illustrations for sample type traits

(Adapted from World Holstein Friesian Federation type harmonisation programme)

Central Ligament



Convex to flat Slight definition Deep definition

Lower ABV

Higher ABV

Fore Udder Attachment

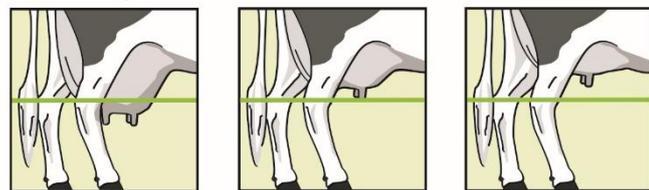


Weak and Loose 4 - 6 Intermediate acceptable 7 - 9 Extremely strong and tight

Lower ABV

Higher ABV

Udder Depth



Below hock Intermediate Shallow

Lower ABV

Higher ABV

Teat Length

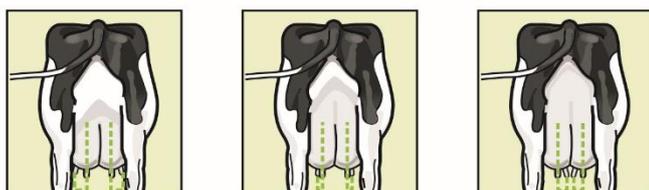


Short Intermediate Long

Lower ABV

Higher ABV

Front Teat Position

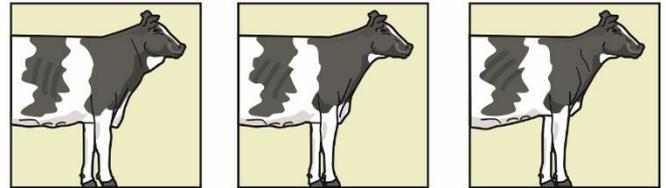


Outside of quarter Middle of quarter Inside of quarter

Lower ABV

Higher ABV

Angularity

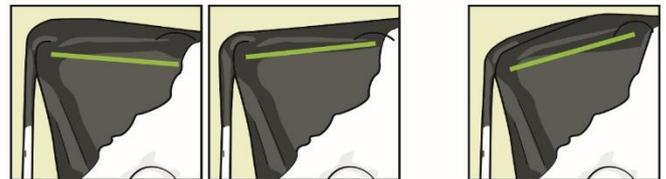


Lacks angularity Intermediate angle Very angular

Lower ABV

Higher ABV

Rump Angle

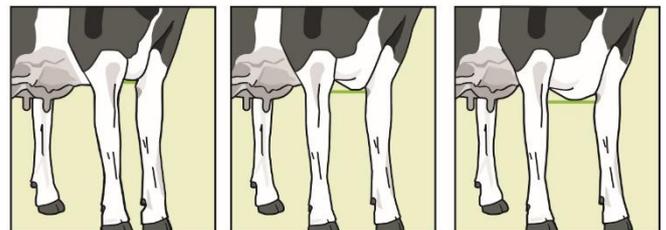


Level Intermediate Slope Extreme Slope

Lower ABV

Higher ABV

Chest Width



Narrow Intermediate Wide

Lower ABV

Higher ABV

Rear Leg Sets



Straight Intermediate Sickle

Lower ABV

Higher ABV

Stature

