

Key messages

- › Australian Breeding Values (ABVs) are an estimate of the genetic merit of dairy cows and bulls.
- › Cow ABVs predict a female’s value for breeding future dairy cattle.

Published twice yearly, ABVs allow farmers to compare the genetic merit of cows between Australian herds. There are three main uses for cow ABVs:

- › Farmers who include production in their breeding objective use cow ABVs to select which cows to breed replacement heifers from.
- › Farmers determine the average genetic merit of their herd using ABVs and monitor genetic progress over time.
- › Bull companies use cow ABVs to identify females from which the next generation of progeny test bulls will come from.

What do ABVs mean?

Currently, cow ABVs are only available for production traits. Production ABVs are expressed in the same units in which they are measured.

- › Milk yield is expressed in litres (L)
- › Protein and fat yield is expressed in kilograms (kg)
- › Fat and protein test percentages are expressed in percent fat (%)
- › Australian Selection Index (ASI) is expressed in dollars of production profit.

Protein ABV	
Cow A	38 kg
Cow B	22 kg
Difference	16 kg

Figure A.

For example, in *Figure A*, Cow A is superior to Cow B by 16 kg. Half of this difference (that is, 8 kg) is transmitted to the offspring.

To estimate the breeding value of offspring, half the breeding value from each parent is combined. This reflects the fact that offspring receive half their genetic merit from the dam and half from the sire.

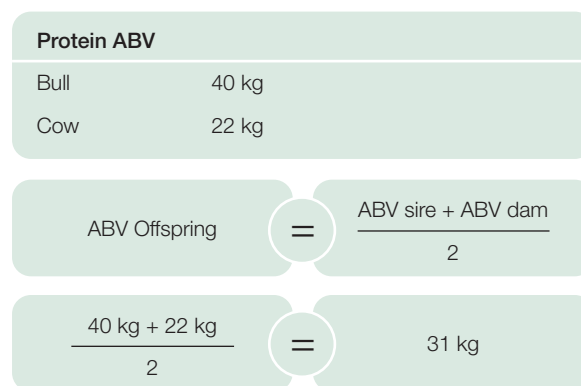


Figure B.

In *Figure B*, the offspring would have an expected ABV of 31 kg protein. That is, the offspring is expected to be 31 kg protein more than the average.

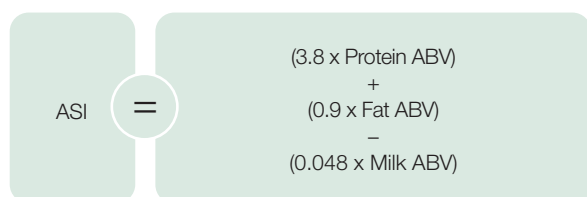
What is average?

Production ABVs are expressed relative to the average of each breed which is set at zero. The average is set to reflect the modern dairy cow in Australia and is updated annually. Cow ABVs can be either positive or negative compared to the average of zero.

What is the ASI?

Dairy farmers rarely select a cow or bull on a single characteristic. More often improvement is required in several traits at once. Selection indexes enable genetic gains to be made in several traits simultaneously. The selection index is one of the most useful genetic tools available to help decide which bulls and cows have the most valuable combination of traits.

The ASI is a production based index that combines protein, fat and milk ABVs and is weighted according to the way Australian dairy farmers are paid for their milk.


$$\text{ASI} = (3.8 \times \text{Protein ABV}) + (0.9 \times \text{Fat ABV}) - (0.048 \times \text{Milk ABV})$$

Accuracy of cow ABVs?

The accuracy of a cow's ABV depends on the quality and quantity of information provided by the herd recording systems. In general, the more information used to calculate an ABV, the more accurate it is and the higher is its reliability. Reliability percentage is used as measure of the accuracy of the ABV.

If the only information known about a cow is her own production, then the reliability is approximately as follows:

Details	Reliability (%)
ABV calculated on one lactation	25
1 lactation plus a sire with a highly reliable ABV	33
3 lactations plus a sire with a highly reliable ABV	40
7 lactations plus a sire with a highly reliable ABV	45

Reliability of cow ABVs

Regardless of how many lactations are available and how detailed the pedigree information is, the reliability is unlikely to exceed 50%. This is because a cow can only have relatively few lactations and offspring. This limits the amount of information available for estimating genetic merit.

This can be compared with sire ABVs where the reliability percentage can get as high as 99%. This is due to the large number of offspring a sire can have, which provide good information upon which to assess genetic merit.

Which cows get an ABV?

Herd recording information is collected from herd improvement centres around Australia and supplied to the Australian Dairy Herd Improvement Scheme (ADHIS) for genetic evaluation. For a cow to get an ABV it must have:

- › records of lactation production in an Australian herd recording system
- › a unique national ID
- › a valid birth date and breed code
- › a known sire that has also been given an ABV

Some cow lactation information may not be used in calculating an ABV because of:

- › abnormally high or low lactation performance
- › lactations commencing for cows more than 18 months or less than 20 years of age at calving
- › lactations that are too close to another or overlap another

Publishing of Cow ABVs

ADHIS supplies ABVs for each eligible cow to herd improvement centres. Farmers can request cow ABVs for their herd directly through their local herd improvement centres.

A listing of the top 2% of cows in each breed is published annually. Bull companies can use this information to select elite cows to breed future high ranking bulls.

Further information on ABVs for bulls and cows is available from the ADHIS website (adhis.com.au).