Assessing dairy cows using ABV's

Technote 6

HIGHLIGHTS

- 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.

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

- Farmers 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?

ABVs are the best estimate of the genetic merit of a cow. ABVs measure the traits or characteristics she is likely to pass on to her offspring.

Cow ABVs are available for forty different traits. The most economically important ABVs are incorporated into three breeding indices as described in Figure 1.

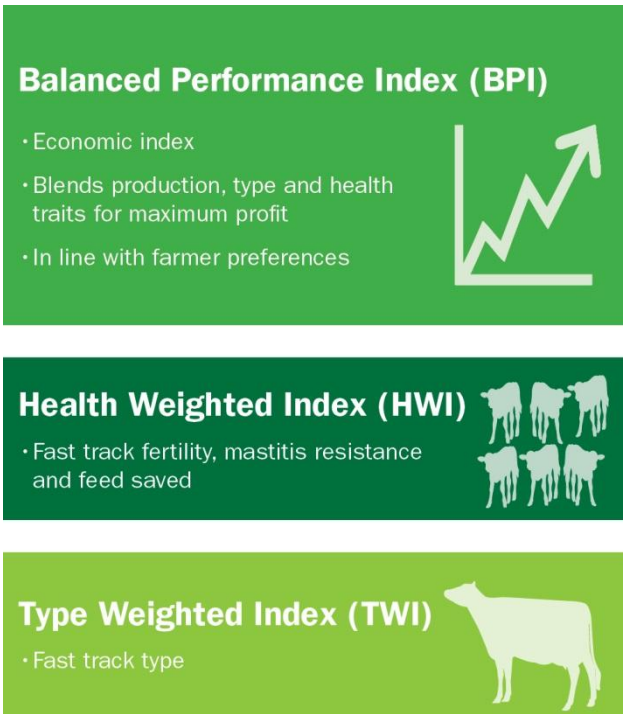

Figure 1: Australia's three breeding indices

ABVs are relative measures. To make sense of a relative measure, it is useful to understand the average of each ABV and how the ABVs figures relate to each other. As illustrated in Figure 2, the ABVs are expressed in units of measure, standard units or a percentage, depending on what's most appropriate for the trait. For example

- Protein ABV of 40 kg means this animal is 40kg greater for protein than average. The average is 0
- Overall Type ABV of 105 means this animal is 1 standard deviation above average for overall type. The average is 100.
- Daughter Fertility ABV of 103 means this animal is 3% greater than average for fertility. The average is 100.

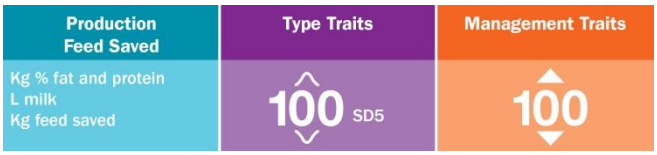

Figure 2: A summary of the expression of ABV traits

Table 1 provides an example of the difference in genetic merit for protein and fertility that can be observed between two cows. 'Bossy' is superior for both protein and fertility and is expected to produce more profitable replacements that are superior for both protein and fertility.

Table 1: Comparing the ABVs of two cows

	Example Cow ABVs		
	Protein kg	Fertility %	BPI $
Bossy	28	104	200
Daisy	22	96	150
Difference	6 kg more protein	8% greater 6-week in-calf rate	$50 more profit
	Half will be passed on to her offspring		

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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.

For example, Table 2 illustrates an example where the progeny of a mating between Bossy and Samplebull would produce, on average, calves that are $100 more profitable than the average Australian cow.

Table 2: The average genetic merit of offspring

	Example Cow ABVs		
	Protein kg	Fertility %	BPI $
Bossy	28	104	200
Samplebull	40	110	300
Offspring	34 kg more protein	7% greater 6-week in-calf rate	$100 more profit
	Compared to the average Australian cow		

What is average?

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

The average of cows that are 6 years +/- 2 years is set at 0 for production traits and 100 for non-production traits 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.

Reliability of cow ABVs?

The reliability 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. Genotyping animals provides a significant boost to the reliability of ABVs, as illustrated in Table 3.

Table 3: Estimate of the reliability of production ABVs for females with different information sources

	Average reliability (%) for production ABVs Individual animal reliabilities will vary
Young heifer (parent average ABV)	25
Genotyped heifer ABV(g)	62
7th lactation cow ABV(g)	64

Which cows get an ABVs?

Herd recording information is collected from herd improvement centres around Australia and supplied to the DataGene 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

For an animal to get an ABV(g) it must have:

- a genotype recorded at DataGene
- 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 cow ABVs

DataGene supplies ABVs for each eligible cow to herd improvement centres, Holstein Australia and Jersey Australia.

A listing of the top cows in each breed is published April, August and December and can be found at www.datagene.com.au

For more information

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