LOGIX focus

Breeding values level the playing field

By Dr Bernice Mostert, geneticist, SA Stud Book

The production of a dairy cow is influenced by factors such as age, calving season, lactation number and stage, pregnancy status, length of her previous intercalving period (ICP), nutrition, temperature, and management. Underlying all these is the genetic potential she inherited from her parents, and which plays a decisive role in her production performance. These influences vary among cows that are milked together.

Emma's average 305-day production is, for example, 5 655kg (based on her most recent milk recording figures), with a milk breeding value (EBV) of +54kg. Blommie, milked in the same group, averages only 4 920kg, but her milk EBV is +419kg.

Emma was born in September 2012 and has already completed nine lactations. She calved for the first time at 30 months and has thus far recorded a lifetime production of 49 636kg. This equates to 12,64kg of milk per day of life. She also has a daughter currently in her third lactation.

Blommie was born in July 2020 and is in her second lactation. She calved for the first time at just 20 months and has so far produced 8 128kg (6,57kg per day of life). At the time of evaluation, she had no daughters in milk yet. Since cows typically reach peak production in their fourth and fifth lactations, Blommie's future potential is still to be realised.

Genetic lines

Emma's sire, Richies Jace Tbone (US, 2003) produced 860 daughters across 67 herds in South Africa. His milk EBV is +27kg. Emma's dam completed ten lactations and produced seven daughters with official milk records, boasting an estimated milk EBV of +31kg. Emma's mid-parent value was therefore +29kg, but this was adjusted to +54kg based on her own and relatives' performance – showing she inherited above-average genes from her parents.

Blommie's sire, All Lynns Louie Valentino-ET (US, 2008), has 1 482 daughters recorded in 67 South African herds. His milk EBV is -129kg. Her dam was evaluated over three lactations and has two daughters with milk records. Blommie's milk EBV is +230kg. This gives her a mid-parent value of +388kg which is further adjusted to +419kg based on her individual performance – substantially higher than Emma's.

Contemporary group performance

In genetic evaluations, a cow's performance is compared to that of her peers farmed under the same conditions. *Table 1* shows Emma and Blommie's deviation from the group average (milk/day).

Emma consistently produces higher than the group average, which supports an upward adjustment of her mid-parent value. Her breeding value of +54kg remains higher than the breed's active average and far superior to that of her peers (-75kg).

Blommie was slightly weaker in her first lactation but already started improving in her second. The fact that her breeding value rose well above her mid-parent value reflects the context of her evaluation:

Table 1: Deviation from contemporary group average for milk production/day.

Emma	Blommie
Lac 1: +2,15kg higher	Lac 1: -0,30kg lower
Lac 2: +1,86kg higher	Lac 2: +0,86kg higher
Lac 3: +3,40kg higher	

She calved young (20 months), was among the last to calve that year, and was only measured at 13 days in milk while others were recorded at peak production.

The genetic model accounts for such differences, ensuring fair comparison. If Emma and Blommie were exposed to the same physiological and management conditions, Blommie would outperform Emma thanks to her genetically superior lineage. Her offspring, when mated to the same bulls, will therefore also inherit better genes than Emma's.

The advantage of breeding values

Breeding values generate a prediction of an animal's genetic potential, with each parent contributing half. For an individual's breeding value to differ significantly from the mid-parent value, both its own performance data and sufficient offspring records are required.

Genomic testing at a young age allows SA Stud Book to identify how an animal deviates from the mid-parent value without having to wait for offspring records. This allows for faster and more accurate selection by improving the prediction of genetic merit.

BLUP (best linear unbiased prediction) enhances breeding value estimates by also taking the genetic trend of the breed into account. Because of ongoing genetic progress and the intensive use of top AI bulls, younger animals generally boast a higher genetic level than their older counterparts. However, it would be a mistake to rely solely on genomic information without local measurements, or to base it only on data from foreign populations. The true value lies in the relationship between genomic data and local performance. SF

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For more information, email Dr Bernice Mostert at bernice@studbook.co.za
or visit *www.studbook.co.za* or *www.logix.org.za*