New traits for genetic improvement

The DairyBio Animal Program is targeting an additional value of $350 per cow per year in Australian dairy herds through genetic improvement, lower costs by enabling selection for health traits and developing improved breeding management tools. Genetic improvement for traits associated with cow health, fertility, efficiency and longevity will lead to greater farm income and improved sustainability and animal welfare, all of which are vital for a vibrant future of the dairy industry. DairyBio is the dairy industry's leading bioscience research program and is a joint venture between Dairy Australia, Agriculture Victoria and the Gardiner Foundation.

In April eight new/updated Australian Breeding Values (ABVs) identified by DairyBio were released by Datagene and added to the ABVs in the Good Bulls Guide. The ABVs in the guide assist farmers and semen resellers to select semen suited to a farm's breeding objectives and increase productivity through genetic gain. The Good Bulls Guide contains the top active bulls that meet the minimum criteria for Balanced Performance Index (BPI) and reliability.

"The BPI combines productivity, type and health traits for maximum profitability according to the dairy farmers objectives." Kevin Argyle, Director of Major Innovation Projects for Dairy Australia and co-director of DairyBio said "With DairyBio leading the research the BPI is Australia's flagship national animal selection index. Using genetically superior sires can improve gross margins - cows with higher BPI produce more milk and last longer in the herd compared to lower BPI cows".

Senior research scientist Dr Mekonnen Haile-Mariam is one of DairyBio's lead researchers and identified the Gestational Length ABV opportunity. He also worked to improve the Calving Ease ABV; and has participated in the development of the Mastitis Resistance ABV. Dr Haile-Mariam grew up in Ethiopia, and while it might be a long way geographically from the AgriBio Centre for AgriBioscience in Melbourne, where DairyBio research is carried out, for Dr Haile-Mariam the 11.4 million dairy cows in his home country dwarf the 1.5 million in Australia.

Dr Haile-Mariam credits the significant agricultural concerns in his hometown with his desire to work in agriculture and when he completed his first degree the only university in Ethiopia at that time was employing new graduates to do teaching and research. "I thought it was a good opportunity - so I joined." Dr Haile-Mariam said "One clear benefit of being a researcher at a university is you get opportunities to do further education such as a Master of Science and PhD degrees. In most cases, if you are lucky, employment with the university gives you the opportunity to travel and study overseas".

Dr Haile-Mariam had finished his PhD in Sweden when he realised the opportunities to do the dairy research he truly loved were limited in Ethiopia, so in 1999 when he saw a position advertised to work as a post doctorate at the University of Melbourne with Professor Michael Goddard he applied, knowing that would give him the opportunity to work on improving Australia's dairy herd through genetic advancements. When he joined Agriculture Victoria to work with Dairy Futures CRC and then DairyBio he was delighted to see the research results reaching Australian dairy farmers almost immediately through DataGene.

"The research I have been involved in over the last two decades in Australia is designed to help farmers to reduce cost of production, by improving fertility, health and animal welfare." Dr Haile-Mariam

said “Now, and into the future most ABVs that I am involved in developing can help Australian dairy farmers to rank bulls for traits that have effect – not only on productivity and profitability – but also on animal welfare”.

Working with industry is important to his research as Dr Haile-Mariam explained “I always want more data – better quality and quantity of data from dairy farmers is the key for providing more reliable ABVs for breeders and farmers to improve the productivity and profitability of the industry”.

Kevin Argyle said “to have so many world class researchers and research facilities working on enhancing the productivity of the Australian dairy herd is fantastic. Dairy Australia invests in this research to ensure that the Australian dairy industry maintains productivity and profitability into the future”.

The Gestation Length ABV, along with daughter fertility and calving ease is an important trait to assist with managing dairy herd fertility. One of the major advantages of a shorter gestation length is to help to tighten a herd’s calving spread, which allows farmers to better match milk and pasture production, improving milk income over feed costs particularly for seasonal and split calving herds. Cows that calve earlier also have more time to recover and cycle before the next mating, increasing their chance of getting back in calf to AI early. For year-round herds, there are also fewer cows with long lactations, shorter average days in milk and greater opportunity for culling of genuinely low producing cows.

The gestation length for a calf is mainly dictated through the genes of the bull the cow is mated to, this is a natural variation. Most bulls fall into the ± 2 days category, but some bulls can influence as much as a 11 day shorter gestation period. By selecting bulls with a shorter Gestation Length ABV a farmer can manage the herd calving spread more efficiently, and a shorter gestation length can also be selected when completing genomic testing on cows. To breed for shorter gestational length select a high BPI bull from the Good Bulls Guide that has a Gestation Length ABV of less than zero – the further from zero the number the shorter the gestation.

Gestation length can also be a useful indicator for calving ease as the existing calving ease ABV has low heritability. By using a multi-trait model - which combines traits like Gestation Length and calving size (subjectively scored by farmers) that correlate with calving ease – this results in a higher heritability ABV which provides greater opportunity for selection. Dr Haile-Mariam said “Recently, in addition to developing the new ABV for gestation length my research improved the reliability of the ABV for calving ease by 15%, and I also worked on clinical mastitis which addresses some productivity and animal welfare concerns of the dairy industry”.

Dr Steph Bullen – Animal Health and Fertility Lead at Dairy Australia - summed up how useful on-farm this new ABV is by saying “Including the Gestation Length ABV in your herd’s AI sire selection process, along with other fertility traits such as daughter fertility and calving ease, is one of the steps you can take to improve the calving pattern and fertility of your herd in the long term. The gains you make with each generation are permanent and accumulate over time, leading to long term improvements in your herds’ performance. The trait is not only highly relevant for seasonal calving herds, but also split and all-year round herds to reduce unnecessary culling and improve production”.

The Mastitis Resistance ABV was also released in April and is a multi-trait ABV – utilising a combination of udder depth, somatic cell count and clinical mastitis records. Due to low hereditability of mastitis, management practices and environmental conditions will continue to have a higher impact on mastitis, but for farmers the Mastitis Resistance ABV is another tool in their belt. To breed for improved mastitis resistance select a high BPI bull from the Good Bulls Guide with a Mastitis Resistance ABV of higher than 100.

As Australian dairy farmers know gestational length and mastitis are important considerations in their management practices, the research that Dr Haile-Mariam and the DairyBio team are doing which is leading to ABV releases such as these will help Australian dairy farmers with animal health and welfare responsibilities and at the same time drive even greater productivity gains.

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