Test Day Model for Production ABVs

Technote 5

Australian Dairy Herd Improvement Scheme

HIGHLIGHTS

- The method used to produce ABVs for milk, fat and protein has been improved in line with the latest research.
- The 'test day model' increases the reliability of production ABVs in all breeds.

The Test Day Model

Millions of herd test records are generated every year but scientists want to know how to get the most out of each and every data point to produce the most reliable Australian Breeding Values (ABVs) Production ABVs reflect a cow's performance and her family's information. But when it comes to her own production performance in the herd, there are different ways that her information could be used. A new method, known as the 'Test-Day model' has been previously implemented for cell count and will now be applied to the production trait group comprised of Milk, Protein kg, Fat kg, Protein % and Fat %.

The new Test-Day model replaces the current aggregated 305-day lactation model. By analysing each herd test day separately, the reliability of ABVs is improved. There are a number of reasons for the improvement but two key factors are lactation curves and test day environment.

Lactation curves

The amount of milk that a cow is expected to produce at each point during lactation is often described by a standard lactation curve. Cows rapidly increase their production in the first few weeks after calving then slowly decline towards her dry off date. However, the actual lactation of a cow is dependent on a range of genetic, feed and management factors and doesn't usually perfectly match the 'standard curve'. By analysing individual test-days instead of grouping production into an entire lactation, the test-day model more accurately predicts a cow's production ABVs and those of her sire.

Test day environment

The environment on herd test day can vary from day to day. For example, a cold, wet, windy day or a heat wave may detrimentally affect cow yields during herd test. As each test day is analysed separately, the test-day model does a better job at handling the environmental factors which, again, improves ABV reliability.

Opening more doors

The new model presents new opportunities for alternative methods of collecting and using data, particularly when data points are intermittent or missing. An example might be new dairy technology that collects milk volume regularly but milk solid yields are collected just a few times during lactation. This potentially increases the number of cows that can be evaluated.

Impact of the Test Day Model

There are two main ways that the new model will impact on ABVs: improved reliability and less bias. This will result in some sire re-ranking.

Firstly, the reliability of production ABVs is higher. For a given amount of data, a bull's ABV will be closer to its true ABV (which is only really known after thousands of daughters have been milking) as illustrated in Table 1.

Table 1: The average % increase in reliability calculated from Test Day Model

	Percent change in Protein ABV reliability	
	21-60 daughters	61-100 daughters
Holstein with genomics	9	7
Jersey with genomics	9	7
Guernsey	15	5
Brown Swiss	12	5
Red Breeds	16	6

ADHIS is an Australian Dairy Farmers initiative that receives the majority of its funding from Dairy Australia through the Dairy Services Levy.
Published by ADHIS Pty Ltd. This Fact Sheet is published for your information only. It is published with due care and attention to accuracy, but ADHIS accepts no liability, if, for any reason, the information is inaccurate, incomplete or out of date whether negligent or otherwise. Copyright ADHIS Pty Ltd 2015. All rights reserved ©

By implementing the new model, there is less bias in the parent average ABVs of young bulls which means less movement with the addition of further information. For example, Table 2 shows that Red Breed bulls moved 0.4 kg Protein less from parent average to ABV after implementing the test day model. This benefit also applies to bulls selected for use as second crop bulls and to early cow evaluations.

Table 2: The average ABV movement between earlier (2010 parent average) and recent (2014 ABVs) before and after the implementation of a Test Day Model

	Average change in Protein (kg) ABV	
	Before	After
Holstein	5.7	4.7
Jersey	3.6	3.0
Red Breeds	-1.5	-1.1
Brown Swiss	-5.1	-2.4

There will be some movement in the production ABVs causing re-ranking of bulls. The correlation between old and new ABVs for fat and protein is at least 0.95 in all breeds (for bulls >60 daughters).

For more information

Michelle Axford
Ph 0427 573 330
Email: 0427 573 330

December 2016

ADHIS is an Australian Dairy Farmers initiative that receives the majority of its funding from Dairy Australia through the Dairy Services Levy.
Published by ADHIS Pty Ltd. This Fact Sheet is published for your information only. It is published with due care and attention to accuracy, but ADHIS accepts no liability, if, for any reason, the information is inaccurate, incomplete or out of date whether negligent or otherwise. Copyright ADHIS Pty Ltd 2015. All rights reserved ©