BREEDING VALUE
FEED INTAKE

Thanks to a database of 4350 cows, more – and more reliable - breeding values for feed efficiency can be calculated. As from April the breeding value for ‘saved feed costs for maintenance’ (SFCM) will be included in the NVI formula. The biased belief that breeding for efficiency results in smaller cows can be banished to the realm of fables.

Efficiency. A word that is considered by some to be slowly paling in significance to become a catch-all, in a similar way to the word ‘sustainability’. But there is a difference. The definition of efficiency is the ability to accomplish something with the least waste of time and effort. Applied to feed efficiency this means the effectiveness of the feed - the output produced by a certain input.

In the dairy sector, the combination of roughage and compound feed complicates feed efficiency, but there is definitely scope for improvement through breeding believes Gerben de Jong, head of the Animal Evaluation Unit at CRV and responsible for generating the breeding value estimations. ‘The data set suggests that 10 percent higher milk production with the same feed ration is feasible. In practice, combining an efficient bull with another average animal translates to a five percent improvement.’

In April 2016 the GES foundation (Genetic Evaluation Sires) calculated the breeding value for feed intake, expressed as kilograms of dry matter, for all bulls with a Dutch/Flemish index rating for the first time. CRV had already started including this breeding value for its own bulls in the Better Life Efficiency breeding index eighteen months earlier.

However, the breeding value for feed intake has its limitations. All it says is something about the amount of feed consumed by a cow, irrespective of what that feed is actually used for. Gerben de Jong illustrates this with an example. ‘The bull Delta Canvas has a breeding value for feed intake of +0.75 kilos of dry matter. The average is 0, so as Canvas daughters inherit half of this breeding value from their sire, these animals eat 0.38 kilos of dry matter more a day. This could lead you to assume that Canvas daughters are not efficient, whereas in reality Canvas inherits 1700 kilos of milk.’

That converts to daily production of approximately 2.5 kilos of milk compared with the average, for which roughly 1.25 kilos of dry matter are required. ‘Canvas daughters would therefore have to consume 1.25 kilos of dry matter more than the average cow, but as they actually consume just 0.38 kilos more of feed they are extremely efficient in practice.’

To make the differences in feed efficiency more insightful, the number of animals used to collect feed intake data from has risen from 2500 to 4350. ‘A lot of data originates from trials at Wageningen UR Livestock Research. Nutreco and Schothorst Feed Research also contribute data and CRV measures feed intake at the trial farm run by the Alders family in Overloon. In addition,'
That extra feed is necessary for maintenance, movement and feed conversion. To clarify, he uses Canvas as an example again. ‘Corrected for production, and according to the index calculations, Canvas daughter have a feed intake of dry matter that is 0.65 kilos less than the average cow (saved feed for maintenance). Converted to the length of lactation that represents a saving of 78 divided by two, equating to 39 euros per cow per year (saved feed costs for maintenance).’

Another example is Delta Olympic. Just like Canvas this bull scores higher than average for feed intake: 1.2 kilos dry matter. Corrected for milk inheritance of 800 kilos Olympic offers a breeding value for saved feed for maintenance of 0.6 kilos of dry matter per day. ‘Olympic daughters therefore eat 0.3 kilos of dry matter more than the average cow, which they don’t utilise for milk production, but for extra maintenance. In financial terms, an Olympic daughter costs 18.50 euro more per lactation than the average feed costs for maintenance.’

**Weight in relation to production**

Canvas and Olympic have 23 and 34 daughters, respectively, listed in the data base with measured feed intake figures. The genomics and the markers for feed efficiency are therefore known for these cattle. This means that a breeding value can also be estimated for bulls without daughters with measured feed intake data. A bull like Canvas with 23 daughters has a reliability of 82% for the breeding value SFM, while based on his pedigree index and genomic information Bouw Finder has a reliability of 60%.

Although the breeding values ‘saved feed for maintenance’ and ‘saved feed costs for maintenance’ have been included in the index since last December, these figures will only start to have a real effect from April 2018. The GES has decided that the breeding value ‘saved feed for maintenance’ will only be weighted in the NVI formula from that moment. The weight of SFM in the new NVI formula is 5%. ‘But it is better to see what the response is to the inclusion of SFM, or the impact this has on the selection in the population,’ De Jong refers to figure 1, which shows the average breeding values of the top 100 bulls in the NVI ratings. Per trait, the average breeding value of these bulls is shown for the current NVI and the new NVI including the breeding value ‘saved feed costs for maintenance’. ‘Once this value is included in the weighting, advances made in breeding values like stature, body depth and body weight will slow. The average breeding value for stature is no longer 105, but 104 so progress is still being made. This is because breeding for production, which is also part of the NVI formula, leads to larger cows,’ says de Jong. His remark alludes to the biased belief that breeding for efficiency produces smaller, narrower cows. ‘That outcome can be expected if you breed purely to save on feed costs for maintenance, but farmers are unlikely to do that. Including this in the NVI creates a certain balance and absolutely no question of negative breeding values for stature or body weight. Cows are continuing to get bigger and heavier, but at a slower pace. Progress will be more proportional to production’ De Jong’s opinion. ‘A cow can have a larger and heavier frame, as long as she produces more in proportion.’

**Summary**

– Since December 2017 the breeding values ‘saved feed for maintenance’ (in kg dry matter) and ‘saved feed costs for maintenance’ (in euros per lactation) for all bulls have been calculated and published.

– In April 2018 the breeding value ‘saved feed costs for maintenance’ (SFCM) will have a weighting of 5% in the NVI formula.

– Weighting in SFCM means that cows may become larger and heavier if they produce proportionally more milk.

**Toppers will climb in NVI ratings**

Farmers who base their breeding goals on NVI, and who can weight in SFM from April will see progression that according to de Jong is comparable to advances made in fertility. The heritability of the breeding values for SFM and SFCM is 0.25. ‘That compares to the heritability for daily milk production.’

‘Adding together the Inet breeding value and the saved feed costs for maintenance, both expressed in euros, will give you an animal’s net financial performance,’ states de Jong. ‘Regardless of any costs for health and fertility.’ Adding the breeding value ‘saved feed for maintenance’ effectively serves to close the circle regarding breeding for efficiency (see infographic on page 7). The higher or lower amount of feed consumed by a cow is expressed as the breeding value feed intake. She produces milk using the total amount of feed, which is expressed in the breeding values for production. The remaining part of the feed is used for maintenance, movement and higher/lower efficiency in feed conversion. The efficiency of that factor will now be shown in the breeding values ‘saved feed for maintenance’ and ‘saved feed costs for maintenance’.

The current breeding values were obtained using data on feed intake that was collected from a population of 4550 cows. ‘This is just the first step. We would naturally love to have more data, but collecting that information is relatively expensive. We don’t expect all the farms to start measuring data, but a larger core group of cows would be ideal for the future – and I am sure that will materialise,’ says de Jong. Page 8 contains an overview of bulls with a low or high score for ‘saved feed costs for maintenance’ for farmers interested in this information in relation to the December index run. There is a highly likely that the new breeding value can cause these bulls to climb or fall in the NVI in the April index.