



Improving feed conversion efficiency

Here, in the second of a series of articles looking at feed conversion efficiency, we explain why the parameter is set to become increasingly important for UK dairy businesses and how it can be improved

Topic 1: What is FCE and why is it so important?

Topic 2: Breeding for FCE

Topic 3: Health and FCE – a holistic approach

Topic 4: Non-feed and management factors

Topic 5: 'Chemical' and 'physical' ration factors

Geneticists are close to developing a breeding value for feed conversion efficiency

Breeding for efficient feeding

There are many aspects of herd management that can influence feed conversion efficiency and in this – the second in our series on improving this measure of performance – we take a close look at breeding and the role that genetics play.

text Rachael Porter

“It’s the holy grail of breeding – something that geneticists and producers alike have been talking about for a while.” That’s DairyCo breeding+geneticist Marco Winters answer to the question of whether it’s possible to select sires for improved feed conversion efficiency (FCE).

“It’s not something that’s included in bull proofs just yet, but it’s on its way. And it may have as an impact on dairy herds as selecting for milk production did many decades ago. It has the potential to be huge.” Work to develop a feed efficiency breeding value that can be added to PLI is on-going as part of the Scottish Agricultural College’s (SAC) Robust Milk project. And it should yield some interesting results later this year, according to project leader Eileen Wall. Her team has been looking at the fatty acid profiles of milk from two herds – at

Langhill and Crichton Royal – that, among other things can predict a cow’s energy balance, metabolic rate and feed conversion efficiency. “And so far things look very promising and we may be able to use this data to predict which cows and heifers are better at converting feed into milk,” she says.

Producer-driven research

Dutch geneticists at Wageningen UR Livestock Research have been examining genetics and using genomic tools in a bid to discover traits and breeding values to help producers breed for improved feed conversion efficiency. “This research is very much producer driven,” says project leader from the Lelystad’s Animal Breeding and Genomics Centre Yvette de Haas. “A large number said that they wanted tools to help them select for feed conversion efficiency – to reduce their feed costs and the environmental impact of their herd by reducing greenhouse gas emissions,” she adds.

The Dutch team took data from Lelystad’s 600-cow experimental herd, comprising mainly first-calved heifers. The data was genetic, in other words their pedigree information, genotypic, genetic profiling was done using stored blood samples; and phenotypic, including feed intake and ration information, milk yield and composition, liveweight and conformation traits.

“With all this information we carried out some genetic analysis and found that feed conversion efficiency was 30% heritable – in other words 30% of the variation in feed conversion efficiency is down to genetics. This is similar to the heritability of milk production, so we know that selective breeding can make a difference when it comes to feed conversion efficiency,” explains Dr de Haas.

“That’s extremely good news for producers. Once this trait has been given a breeding value it can be added to bulls’ proofs and progress in breeding for feed conversion efficiency will be relatively rapid, if that’s what producers want to select for,” she adds. “It can be as rapid as the progress seen when producers select for milk production – so that’s really exciting.”

Looking to genomics, the team has identified one marker that looks to be linked to feed conversion efficiency, but more work is needed here. “Mainly because the profiles and data from 600 cows is not enough to draw a firm conclusion – data from more cows is needed.

Dr de Haas’ team is working with the Robust Milk project team at the SAC. “It’s certainly looking very promising and we’re linking up with researchers and geneticists in other countries. The key is to get as much data from as many cows as possible and the only way to do that is to collaborate.”

And collaboration should mean that producers, in the Netherlands at least, will be able to select bulls using a breeding value for FCE certainly by April 2013.

“And it should see the Netherlands’ current average FCE rate of 1.2kg of milk for every kilogramme of dry matter fed increase considerably during the next few years. We’re excited about it and, so are producers. They’re eager to start using the new information.”

Common-sense approach

For now, producers who want to breed for increased FCE should look to use bulls that will sire daughters that are suited to their particular management system, according to Avoncroft’s David Matthews. “It really is a case of horses for courses,” he says, adding that it’s common sense really.

“If you’re running your herd on a grass-based extensive system, you need to breed heifers and cows that will get back into calf easily. Fertility needs to be good if you’re running a system with a tight calving pattern. Milk output, and therefore feed conversion efficiency, will then be optimised if not maximised.

“Other systems need a close eye on milk, fat and protein production and cow size or stature. Avoiding cows that are ‘too big’ is important as they require more feed for maintenance and are therefore less ‘feed efficient’.

“Although size is often associated with more capacity for feed and therefore more milk, there are plenty of sires out there that produce medium-sized daughters that can produce just as much milk as their larger herd mates. Efficiency is very much about balance and avoiding extremes.”

DairyCo’s Marco Winters agrees: “Cow size is certainly a proxy trait – one that’s linked to feed conversion efficiency. Smaller, compact cows that produce as much milk as large cows are certainly more efficient – they have a lower energy requirement for maintenance. And until we have a breeding value for FCE, producers will have to select on these proxy traits if they want to produce as much milk from a kilogramme of feed as possible.”

Breeding goal: producers are eager to select for feed conversion efficiency

