

# Breeding to improve

Some cows are better able to adapt to changes in the environment than others – they are more resilient. And the good news is that it's possible to improve resilience through breeding.

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**E**very producer will have cows in the herd that, no matter what life throws at them, production remains steady. But there will also be other cows in the herd where production fluctuates much more on a day-to-day basis. One day they achieve an average milk production of, say, 30kg, the next this dips to 25kg. “All cows face difficulties or problems in their lives. But some cows have more resilience than others,” explains Wageningen University PhD student Marieke Poppe. “They can simply cope with day-to-day disturbances better than others.”

The university's professor of breeding and genetics Han Mulder agrees: “For a long time it was thought that producers could prevent these fluctuations with optimum management. But that doesn't always work and producers can't control everything.”

He lists a number of examples: “A virus can go through the herd, the quality of the grazing or grass silage can

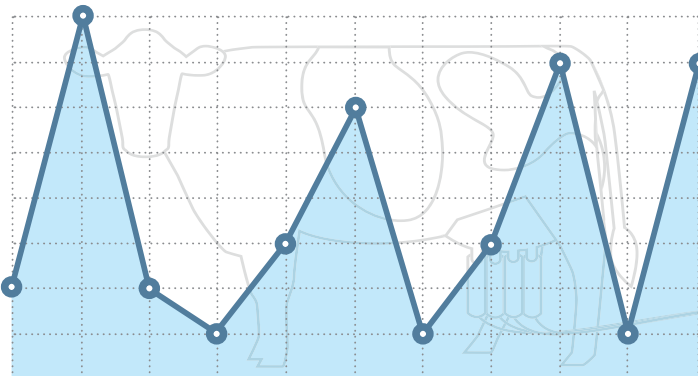
vary, or weather conditions may result in heat stress.” Miss Poppe is looking at whether it is possible to breed for resilience. “We describe resilience as the capacity of the animal to be minimally affected by disturbances or to rapidly return to the state pertained before exposure to a disturbance,” says Wageningen University researcher Tom Berghof. “We know that there are differences in resilience between cows, but are they also hereditary? And can we quantify these differences?”

## Fluctuating yields

Producers will already be able to indicate, instinctively, which cows are better able to cope with ‘disturbances’. “Producers managing smaller herds will find that easier to do than those with larger units,” says Miss Poppe. “And then there's the question of sire selection – which bulls will produce daughters that have good resilience?” The team looked at different indicators that could serve

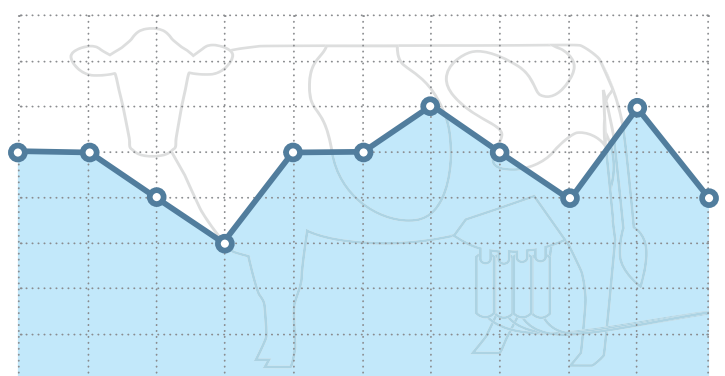
## COWS WITH LOW RESILIENCE

The daily milk production of cows with low resilience fluctuates more when the herd is faced with potential stressors and changes



## COWS WITH HIGH RESILIENCE

The daily milk production of high-resilience cows fluctuates less when they are faced with potential stressors and changes



—●— milk production

# cow resilience

as a measurement of resilience. Key was fluctuations in daily milk production. “To measure resilience you need frequent measurements of a characteristic that is affected by a disturbance. Thanks to milking robots, a huge amount of data on daily milk production is available,” says Mr Mulder.

So, what does daily milk production say about resilience?

“The more fluctuations in daily milk yield, the less resilient cows are. Cows with little variation in milk production per day are more resilient,” says Miss Poppe. The team took milk production data from nearly 200,000 dairy heifers from more than 2,700 dairy farms. They first determined the heritability of fluctuations in daily milk production and this was corrected for age at first calving, lactation length, and farm and season. The heritability was just above 0.2. “This means that about 20% of the differences in animal resilience are influenced by genes. And that’s quite high,” she says. “It is comparable to heritability rates for, for example, milking speed and rear udder height. So, from that, we can conclude that it is possible to breed cows that are better able to cope with disturbances.”

She also looked at the relationship between fluctuations in milk production and health characteristics. “We see that cows experiencing fewer fluctuations in daily milk production also have better udder health. And they also have a better lifespan and are less susceptible to

ketosis,” she says, adding that the work also looked at the relationship between fluctuations in milk production and dry matter intake. Cows with relatively little variation in daily milk production – and therefore more resilience – consumed more feed than cows with experiencing fluctuations in milk production.

“Cows that are better able to cope with disturbances and show fewer fluctuations in daily milk production are, in effect, consuming more energy to deal with disturbances.”

That does not mean that resilient cows are, by definition, less efficient. “There will be cows and sires that score well on both levels, with resilience and efficiency,” says Mr Mulder.

He also looked at the economic importance of breeding for resilience. “If resilience has an impact on farm profit, it should be in the breeding goal,” he explains. He is convinced that resilience has economic value.

“Producers with resilient cows receive fewer alerts. And resilient cows need fewer treatments for diseases, such as mastitis and ketosis, and the amount of labour is lower. Resilient cows are those in the herd that, typically, producers don’t have to worry about.”

## Breeding goal

The team also looked at what happens when resilience is included in the breeding goal. They opted for a simplified breeding goal, which includes milk production (30%), udder health (20%), longevity (30%) and resilience (20%). Although this results in a lower milk production (–6.3%), the improvement in resilience doubles (102.6%). The chance of alerts also decreases by 8.4%.

“Breeding for resilience clearly has added value,” says Mr Berghof. “It reduces the labour requirement, fewer treatments are needed, cow lifespan increases, and it improves producers’ job satisfaction. It may result in lower genetic progress in terms of milk production but, on balance, the herd and business efficiency is improving.” |

## Cows that can easily adapt changes

Ration changes, a virus that goes through the herd, poor weather conditions. Some cows can handle all these things better than others. In other words: these cows have more resilience.

Researchers define resilience as an animal’s ability to continue to function normally during disruptions or to recover quickly if the performance of the animal is affected.



## Breeding for resilience

- There’s a trade-off between resilience and efficiency.
- Resilience has an economic value, so it is possible to include resilience in the breeding goal.
- Breeding for improved resilience can result in lower genetic progress in milk production, but the overall progress at farm level improves.
- Work is looking at if resilience can be determined on the basis of activity measurement data, possibly in conjunction with milk-production data.