

Breeding for animal welfare

Chickens that do not peck each other to death, sheep with fewer maggots in their tails and double-muscled cows that can give birth naturally. Wageningen researchers are working on breeding programmes targeting animal welfare. ‘Society doesn’t want ill-treatment of livestock.’

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Lots and lots of meat, milk and eggs. Fast growth, strong immunity... it is for characteristics like these that breeding animals are traditionally selected in the livestock sector. And with impressive results. The yield per animal has risen spectacularly in the last century. But this top production has a downside too: when it comes to animal welfare, it leaves a lot to be desired. Chickens peck each other to death, pigs chew on each other’s tails and double muscled cows can only give birth by Caesarian section.

‘These things are coming in for more and more attention,’ says Rita Hoving of the Animal Breeding and Genomics Centre at Wageningen UR Livestock Research. ‘Society doesn’t want ill-treatment in the livestock sector. We are therefore working together with the



sector on breeding programmes with which we can improve on animal welfare by breeding animals that will not need as much veterinary care. Examples are cutting tails or carrying out Caesarians.'

NASTY WOUNDS

Hoving gives the example of the sheep disease myiasis. 'Sheep with long woolly tails run the risk of flies laying their eggs in them,' she explains, 'especially when the tail is wet from faeces. The maggots eat into their flesh causing nasty wounds.' Most breeds of sheep, such as the Texel sheep, have short tails and

therefore do not suffer from this problem, but some English breeds have long, thick tails. 'Farmers used to be allowed to cut the tails but that has not been allowed since 2008,' says Hoving. 'An exception is made for only three English breeds. But even for them, farmers would rather not have to cut the tails. After all, as an intervention it affects the animal's integrity.'

But not cutting tails means a higher risk of myiasis, especially in the warm summer months. Hoving: 'Our research shows that the length of the tail is partly a matter of heredity and that you can easily breed for it. We estimate that you could reduce the tail length of English breeds from 20 to 10 centimetres in 20 to 25 years. That is enough to solve the problem: sheep can easily hold up a shorter tail when excreting, so it will no longer get wet.'

Many of an animal's characteristics are hereditary, explains Hoving. If there is a natural variation in this, >



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you can select animals for it. If for example you continually cross-breed the sheep with the shortest tails, the tail length will decrease with each generation. 'We have been applying that principle for centuries,' Hoving emphasizes. 'It is the basis for domestication. So no out of the ordinary techniques are used.'

This does not mean there is no modern technology involved, however. Breeders use advance computer programmes to create an image of the perfect breeding strategy. This is based on information about the ancestry and the 'breeding value' of particular animals: their genetic predisposition to a particular characteristic. 'Breeding has been done for decades using this kind of software,' says Hoving. 'Our research helps to improve those breeding programmes.'

CALVES ARE TOO BIG

Following the same principle you can breed for polled (hornless) cattle so that you no longer have to dehorn the calves. This is a painful intervention which has to be done without anaesthetic and leaves the calf in a lot of pain. Wageningen research has shown that in just 10 years of targeted breeding you can obtain a cow population of which half are polled. In practice, however, there are still relatively few polled breeding bulls that meet the sector's high standards. Dehorning is therefore still standard practice, although breeding for polled cattle is gradually gaining ground.

Double-muscled cows pose a bigger challenge. Nowadays they are almost all delivered by Caesarian because the calves are too big for the birth canal. Jan ten Napel, who also works at the Animal Breeding & Genomics Centre at Wageningen UR Livestock Research, led a project between 2006 and 2012 in which researchers worked with the sector to find out whether anything could be done about this. 'At first breeders were wary,' explains Ten Napel. 'They were afraid that you could only solve problems by doing something about the extreme muscularity of the cows, whereas that is precisely their trademark. But it quickly turned out that the problem was not their muscle tissue but their bones.' An unintended byproduct of selection for the clearly visible muscle is a smaller skeleton – and this includes the pelvis. So the challenge was to find out whether you could breed cows with a bigger skeleton but still with that unusual muscle mass. This turned out to be possible.

The researchers used advanced models in this research as well to calculate breeding values. 'The difficult thing about this,' says Ten Napel, 'is that you are of course

breeding for something much broader than a natural birth. There are all sorts of other characteristics that are important as well, such as growth.' If you breed for pelvis size, you are by definition not breeding so much for growth, he explains. 'And you also want to prevent inbreeding. It is always a question of weighing up one thing against another.'

For this reason, change comes about slowly in practice. When it will no longer be necessary to carry out Caesarians on double-muscled cows, Ten Napel does not venture to predict. 'There are frontrunners in the sector that are already breeding for pelvis size,' he indicates, 'and there are already some double-muscled cows giving birth naturally. We have no evidence that their death rate is any higher than the average. Now we will have to wait and see how quickly the sector picks up on this.'

ANTISOCIAL FAMILIES

Selecting for physical characteristics is just one of the possible ways of boosting animal welfare. Another is selecting for behaviour. The social behaviour of animals that are kept at close quarters with each other, such as pigs and chickens, can pose the toughest welfare problems. 'Laying hens often peck each other,' says Piter Bijma, a colleague of Hoving's and Ten Napel's. 'Sometimes even to death. Now the tip of the beak is clipped off shortly after hatching, in order to limit the damage. If you don't do that, the death rate can be up to 40 percent in extreme cases. And pigs push and bite each other. That is bad, not just for their welfare but also for productivity. Stressed animals do not grow as well.' So the Wageningen researchers wondered whether you could breed for more sociable animals. If so, you could solve these problems. 'The difficulty is,' says Bijma, 'that breeding for behaviour is much harder than breeding for productivity. It is very easy to measure the number of eggs or kilos of meat. But you can only measure social behaviour by doing thousands of observations. That is far too labour-intensive.' So Bijma and his colleagues do this research indirectly. They do not look at the animals themselves but at the others they share the same space with. How many of them die, or does their growth lag behind? This is relatively easy to track for thousands of animals and therefore at family level too. Bijma: 'If the chickens in family X's run die at a relatively fast rate you know you've got an antisocial family on your hands.' By studying the family tree like this, the Wageningen researchers discovered that social behaviour has a strong genetic component. Interestingly, it is not just the genes



‘Breeding for behaviour is much harder than breeding for productivity’



of the ‘peckers’ that contribute to this, but also those of the victims: some families go under more often than others. Two breeding values turned out to be significant for breeding out pecking: an animal’s capacity for survival and its influence on the survival of its fellows. ‘We are now working on finding out which genes are involved,’ says Bijma. ‘But even without genetic information we have already got quite far, working with poultry breeding company Hendrix Genetics. Our estimate is that you could reduce the death rate by 3 to 4 percent per generation by breeding for more sociable animals.’

PREFERENCE FOR TRIMMING BEAKS

On paper, then, the prospects for this kind of breeding look good. In practice, however, it is not easy to exploit their potential to the full. ‘Breeding that targets welfare issues is often detrimental to productivity,’ says Bijma. ‘If only because you then have less scope for selecting for production. It seems, for example, that the more sociable chickens start laying eggs a few days later. Chicken farmers are not keen on that.’ For the time being, some of them prefer to go on trimming beaks. ‘The expectation is that in the long run it will be banned,’ says Bijma. ‘And then at least Hendrix Genetics will have a more sociable chicken at the ready.’

Jan ten Napel comes across the same considerations in his interaction with breeders of double-muscled cows. ‘There are a lot of breeders who want to wait and see how well the animals bred for this new purpose will do in the long term in the inspections,’ he says. ‘There is also still a debate among the breeders themselves as to whether the cows suffer more from a Caesarian than from a natural birth.’ A Belgian study suggested that it makes little difference in terms of animal welfare. But the crucial argument for the public is that ‘it is not normal’ and ‘not natural’. ‘It all depends now on how important the breeders think this is,’ says Ten Napel. He is optimistic. ‘A growing group of breeders are working on this. I think it will work.’

Support among breeders is crucial to breeding for shorter sheep’s tails too, says Rita Hoving. ‘Choosing characteristics to select for remains a matter of weighing things up,’ she says. And there remains one challenge. There are relatively few pig and poultry breeders, and they can change track fast. But the selection of cattle and sheep is in the hands of thousands of livestock holders. Hoving: ‘Besides the question of to what extent you can select for welfare characteristics at all, there is also the question of how to motivate such a large and diverse group to commit themselves to it.’ ■