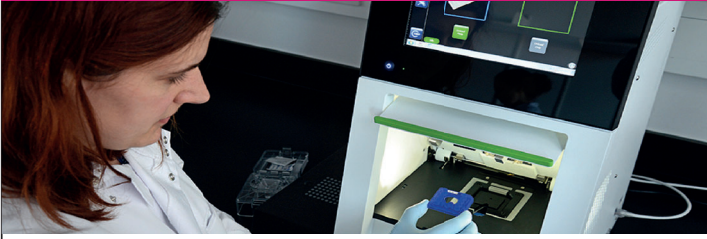


Story Card 1

Dr Anna Sanchez
Animal Genetics Researcher



I am an animal geneticist working at a research institute. I am interested in genomics, which is about understanding what the various regions of the cow's total DNA do, and how they relate to particular traits which cattle breeders are interested in. Rather than focus on single genes, we consider lots of genes and their interactions without knowing how all the individual genes work. We take hair or blood samples, and use complex statistics to identify patterns in all the DNA of the cow or bull, which we can then associate with inheritable features. These patterns are used by farmers and breeders to select cattle which score well for these traits. We are increasingly looking at how the genetic patterns are controlled, which is more how a light dimmer works than a simple on/off switch. It's slow, careful work, because 'simple' characteristics can be really complicated, with lots of genes interacting with each other. For example, why does improving milk yield often result in lower fertility in dairy cattle? Can our understanding of the cattle genome enable farmers to get good yields without compromising the fertility of their cows?

Cattle Breeding

Story Card 2

Pieter van Dam
Breeding Co-operative Director



I am the Director of a cattle breeding co-operative. I sell semen from prime breeding stock bulls all over Europe and even wider. In the past we selected mainly for production traits like milk yield, body weight growth or increasing a cow's productive life. Nowadays, with the help of genomic science, the focus has broadened to include a lot more animal health and welfare issues, disease resistance, fertility, and offering animals selected to suit particular environments better. Maybe we will be able to reduce methane emissions in future. But we cannot improve everything. There are always trade-offs. What should be my priorities? And selecting desirable traits in cattle takes a long time. How do I make breeding decisions today which will take 10-20 years to become established in farmers' herds, perhaps in different environments? And who should our co-operative be asking farmers, retailers, consumers, the government?

Cattle Breeding

Story Card 3

Hermann Andereg
Alpine Cattle Farmer



Every spring once the snow melts we take our cows up from my Alpine village to the high summer pastures where they feed on rich grass and flowers. In September we lead them in a colourful procession back to the valley for the winter, where we feed them hay in our barns. Our milk is used to make local artisanal cheese in a small co-operative with neighbouring farms. This is what my family has done for generations, but I want to improve the performance of my herd under today's hard economic pressures. My son at the agricultural university tells me that advances in understanding the genome of dairy cows are no longer just for the big breeds like Holstein-Friesians, but could help smaller local breeds like mine. There are European projects like BovReg which might identify what regulates the genes behind the traits of relevance to our cheese production, to make our output a more consistent quality.

Cattle Breeding

Story Card 4

Hans Wettermann
Government Scientific Advisor



I am a climate scientist working on policies to reduce our climate change impact. My daughter's friends tell her she should stop eating meat because cows have as big a climate impact as cars. Methane is emitted by ruminant animals, mainly dairy and beef cows and sheep. Roughly similar amounts of methane are released during fossil fuel production. Some methane also comes from landfill waste sites and rice cultivation (the world's most widely used staple food). Eurostat statistics estimate that methane from cattle contributes less to climate change (5%) than carbon dioxide from transport (20%) in Europe, but it is still a significant factor. But how much? These are estimates because many complex factors are involved which environmental scientists are seeking to understand better. How can it be reduced? What cattle are fed can make a difference. If cattle are pasture-fed the regenerating grass acts like a carbon sink, reducing the climate impact; destroying forests to grow feed for livestock increases the impact. Geneticists and animal scientists are exploring how cows might emit less methane. Another factor is time. CO₂ just accumulates in the atmosphere year after year. Methane causes a stronger greenhouse effect but it decomposes in about 12 years. Oxford research suggests that slowly reducing methane emissions could help stabilise global temperatures. Taking account of these factors is my job, but it is not easy!

Cattle Breeding

Story Card 5

Jacques Boucher
Environmentalist



I am worried about the way livestock farming has gone since we started turning animals into super-efficient milk and meat machines, and paid less attention to them as creatures with their own lives. I don't say we should stop having food animals, but I want to get rid of factory farming systems where animals are used as products with no interests of their own. If we must have indoor dairy units, the cows shouldn't be shut in all the time and should have access to grass and outside air. But we should move to more pasture fed cattle, which is better for the animals, helps biodiversity and relies less on buying in additional feed that may add to global warming. Pasture-fed cows grow slower and milk less, but shouldn't we be prepared to pay more for meat and milk that's been humanely and environmentally produced? Farmers should be given incentives for this, and for cows emitting less methane.

Cattle Breeding

Story Card 6

Tiina Mikkelsen
A veterinary perspective



I help farmers keep their cattle healthy, and make regular visits to keep an eye on their animals. There are a lot of issues day to day with the diseases that cattle get. It can be more of a problem in intensive units because disease can spread more easily, but the handlers often spot problems earlier than they would out in the field. And outdoor animals are more susceptible to parasites. As with human health, antibiotics were a great boon at first to treat sick cows, but now we have to be much more careful only to use them when we really need to. This is to reduce the risk that bugs that are resistant to the antibiotics become dominant, and the resistant bugs then get passed on to humans. It would be really great if geneticists could understand the genetic basis for diseases and breed animals less prone to things like mastitis (udder disease) and other diseases like cattle tuberculosis.

Cattle Breeding

Story Card 7

Elizabetta Nowak : Using genome editing to
create hornless dairy cattle



Horns in cattle can cause harm to other cows or to their human handlers. Removing horns is done routinely in young calves in farms in the US and Europe. It is an unpleasant and painful process, which handlers often don't like doing, but it is considered justified on welfare grounds. Some beef cattle have a natural genetic variation that does not grow horns, but this difference is not normally found in dairy cattle. Breeding this hornless variant into dairy cattle would take many years, and crossing beef cattle with dairy reduces their genetic merit as dairy cows. With genome editing we could achieve the same thing directly and more quickly by making a small edit in the dairy cattle genome. Beef and dairy cattle are the same species, so foreign DNA is not involved. Is this ethically acceptable or not, if it achieves the same result but by direct human intervention in the genome? And should we be stopping a cow from growing horns?

Cattle Breeding

Story Card 8

Joan Brown
A Consumer's Perspective



I like to think of myself as an ethical consumer. When it comes to eating beef or drinking milk, I would like to be sure the animals have had a good life with high standards of welfare. I am getting very concerned for my children's future with climate change getting so bad, so reducing methane emissions from cows is really important. But it's difficult if all that means paying more for my milk and meat. I have a limited budget to spend on food for the family, and they're talking of making redundancies at my workplace, so there could be less money coming in. Should I just compromise my principles, or do I give up something else in the weekly budget, to spend a bit more of it on food that I feel OK about where it came from?

Cattle Breeding