

## Breeding and Profit in the 1800s

After discovering evolution, humans begin eagerly applying its principles. On the one hand, they are motivated by the prospect of a general improvement of their own species. On the other hand, they want to get rid of those traits in other species that they find uninteresting or unprofitable, and boost those that benefit humankind. People argue in favour of applying selective breeding procedures to their own and other species because of the resultant economic gains. Breeding has been of no benefit, either economic or otherwise, to other species.

### 1883 THE SCIENCE OF HUMAN BREEDING

Scientists consider the degeneration of human species to be a serious problem. Charles Darwin's half-cousin Francis Galton applies evolution theory to the study of humans. Galton is interested in the heredity of human characteristics and in the possibility for racial improvement through breeding. According to Galton, desirable features in a human include greatness, genius and intelligence. Galton believes in the connection between intelligence and measurability. He himself ranks quite high on the scale of human intelligence, since he very much likes to measure things. Galton applies statistical analysis to the data he collects on humans.

In Galton's utopia, all gifted individuals can achieve a significant career, marriage is a highly regarded practice, and racial pride is encouraged. The weak get a place of shelter in monasteries where they are to live in celibacy. In Galton's opinion, the Church has historically had a degenerative effect on the human race as it has forced superior-minded men to remain celibate, whereas only the weakest individuals have procreated. The Church has also imprisoned and even executed scientists and other intellectuals during their potentially reproductive years.

Galton calls his new discipline "eugenics". He is in favour of arranged marriages based on genetics, and suggests that procreation by the parents best suited for breeding must be supported. Galton's own marriage is a childless one.

Major disputes in selective breeding include the connection between the environment, heredity and the individual's development. There are also questions about the extent to which desirable or, conversely, undesirable traits, such as mental retardation and alcoholism, are inherited. Inbreeding may be seen as positive and even advisable if the family's individuals are good and healthy.

### 1910 EUGENICS RECORD OFFICE

The Eugenics Record Office is founded in New York. It concentrates on eugenics and on human genetics. The office is intended to chart heredity and to oversee procedures related to sterilization. The main focus groups for United States sterilization programmes are the mentally defective, but reproduction by deaf, blind, epileptic and deformed people is also restricted by forced sterilization programmes. The people in charge of these programmes are white, and the programmes are particularly focused on other races.

The Eugenics Record Office merges with the Station for Experimental Evolution in 1920. ERO ceases operations in 1944.

### 1932 THE THIRD INTERNATIONAL EUGENICS CONGRESS

Leonard Darwin is unable to attend this congress, but declares that the world will come to an end if the teachings of eugenics are not applied.

### 1935 THE LEBENSBOHRN BREEDING PROGRAMME

Racial hygiene is considered important in Germany. In 1935, the Lebensborn (Fountain of Life) programme is set up as a child healthcare institution of sorts, offering premium Aryan mothers economic support, maternity and prenatal counselling, as well as assisting unmarried mothers in the placement of their racially pure children. In order to be accepted into the programme, women have to be of certified Aryan descent. The Germans consider the traits of a very limited number of other races beneficial to their own. Norwegian women, for example, are popular Lebensborn mothers.

### 1939–1945 AKTION T4 CULLING PROGRAMME

Humans in Germany create an extensive euthanasia programme to cull all those individuals who are a strain on society. These include the physically or mentally ill, the mentally defective, crippled, or those otherwise in need of constant care. The developers of the programme consider this culling an act of mercy to its subjects, who can in this way stop being a burden on others. These activities begin with the culling of human children, but later adults and healthy people are also culled. These killings are done with either injections or gas. In response to criticism, the human Adolf Hitler publicly discontinues the programme in 1941, but it carries on in secret. An estimated 275 000 people are culled from German society under the Aktion T4 programme.

### 1939 THE MASTER RACE

In Nazi ideology, Germanic peoples are descendants of the proto-Aryans, whose roots lie in ancient Atlantis. Somehow this leads to the Germanic peoples being superior to all other races, including other European ones. Nazi Germany intends to cull the peoples of nearby regions whom they have labelled inferior human beings, such as the Poles and other Slavic peoples, as well as the Roma and the Jews, so that the Aryan race can spread out further.

### 1943–1944 JOSEF MENGELE'S TWIN STUDIES

Twins are of particular interest to Josef Mengele, a dedicated human researcher. He tries to find a way to reproduce children of his own race two at a time. In order to carry out his studies, Mengele conducts research on human children from non-Aryan races. Nearly 3000 children perish in Mengele's experiments.

### 1939 EUGENICS MANIFESTO

A 1939 article in the journal *Nature*, a medium of communication highly respected amongst humans, urges the importance of eugenics for the human race. According to the manifesto, human genetics can be raised to a higher level than anyone ever dared imagine. A genetically improved human could, in the future, master the evils threatening civilization. The nature of the evils in question is left unspecified. The process will be a long one, and preparations must begin promptly. Citizens must not be forced into measures aimed at racial improvement. Instead, they must be made to understand the programme's universal benefits.

### 1959 IN VITRO FERTILIZATION

The human Chooq fertilizes a rabbit in vitro, a fertilization that takes place outside the body. The first test-tube human is born in 1978.

### 1953 THE STRUCTURE OF DNA IS DISCOVERED

James Watson and Francis Crick create a model of the structure of DNA. Humans consider this the most significant discovery of the age. Watson and Crick's model explains how information affecting heredity is coded into cellular DNA, and opens up the path to the speedy development of molecular biology.

### 1959 CLINICAL GENETICS

Understanding of the significance of the chromosome leads to the birth of a new, specialized discipline. In clinical genetics, classical genetics meets a new technology specialized in cells and chromosomes, making it possible to identify the chromosomal basis of, for example, Down syndrome. Genetics, previously seen as a political and economic question, becomes a sub-discipline of medical science. In Finland all citizens are covered by healthcare and can obtain information about their heredity. They are guaranteed the right to health care, but, at the same time, they are held responsible for their own health and the health of their offspring.

### 2009 THE COLLAPSE OF THE FINNCATTLE HERD

The Eastern and Northern Finncattle herds are endangered. There are 800 Eastern Finncattle cows and 1000 Northern Finncattle cows. The Western Finncattle also produce more milk and are larger in build, number 3000 cow individuals. Out of all Finncattle, 1.2 percent are monitored for their productivity. The human artist Miina Aikijärkkä is especially devoted to protecting the Eastern Finncattle.

### 1950 THE DECLINE OF FINNCATTLE

Only half of the cows whose milk-production levels are being monitored represent Finncattle. During the 1960s, Northern Finncattle nearly vanish from the Earth.

### 1970 HUMANS WANT TO EXTERMINATE EASTERN FINNCATTLE

Artificial insemination centres stop donating the semen of Eastern Finncattle, despite requests for it.

### 1990 HUMANS BECOME INTERESTED IN PRESERVING FINNCATTLE

In 1990, humans found Suomen Aikijärkkäry, an association for the preservation of the dwindling numbers of Finncattle.

### THE CULLING OF CATTLE

Humans create a euthanasia programme for cattle as well, since it is beneficial to cull those individuals who are a burden on production. A cow is culled when her milk production fails to meet human demands, or health problems arise affecting her fertility or udders. The planned culling takes place at the end of lactation. The decision on culling is made when deciding on a cow's fertilization. Immediate culling may also be carried out due to acute illnesses or accidents. Most bovines are culled because people want to eat them. All cattle are covered by the euthanasia programme.

### 1950 THE BELGIAN BLUE

A Belgian professor creates a new breed of cattle, whose body does not produce myostatin, a type of protein, consequently, their muscles stop growing after reaching a certain size. With line-breeding, a form of inbreeding, he produces individuals with mutated myostatin. Once this trait is established, the Belgian Blue is complete. At birth, a Belgian Blue calf has twice as many muscle cells as regular calves. Because of their overgrown muscles Belgian Blue cows cannot give birth through their birth canals, and so their calves are born by caesarean section

### 1958 FINLAND'S FIRST 100-TONNE COW

The Ayrshire cow Nopsa 100-151323 AAA from Kurikka is the first cow in Finland to yield over 100 000 kilos of milk. Nowadays, such super-cows are quite common. They produce at least 80 litres of milk per day, or 25 000 litres per year.

### 1960 FINLAND'S DAIRY FARMS

Finland has roughly 200 000 dairy farms and 1.2 million cows. The numbers of cattle are small and they commonly live in cattle sheds with stalls. The owners consume most of the milk that their farms produce.

### 1960 FACTORY FARMING

The USA begins factory farming of cattle and pigs. Chickens and the broilers bred from them have been produced in factory-like conditions since the 1930s. Factory farming involves gaining the maximum profit for the least input. It often involves keeping animals in large indoor spaces. It differs from other factory-production practices in that the products being produced are alive.

### 1990 DAIRY FARMS IN FINLAND

Finland has 46 568 dairy farms. The bovine population is 1 359 700, of which 489 900 are dairy cows. In 1990, these dairy farms produce slightly more milk than nowadays, but milk production per dairy farm increases threefold and the number of cows per farm doubles by 2013, even as the total cattle population decreases.

### 2013 FINNISH DAIRY FARMS

In July 2013, there are 9019 farms specialized in dairy production in Finland, of which 130 are organic dairy farms. This number will halve within five years. The average herd consists of 20 individuals. The new cowhouses require a minimum of one hundred cows. A few cowhouses have been built to accommodate over three hundred cows. The new houses have free stalls, but there is still thousands of old stanchion bars. 53–63 percent of dairy individuals live in the old-fashioned tie-stalls. Total milk production remains the same as in 2007–2012. This is due in part to the cows' reduced fertility. There are 911 940 cattle in Finland, of which 283 110 are dairy cows.

### 2010 FINLAND JOINS VIKING GENETICS

Breeding businesses get bigger. The smaller businesses merge and have fewer employees. Fewer people control ever-increasing market shares. Competition between breeding businesses that sell semen gets tougher. Viking Genetics, distributor of Nordic sperm, becomes the world's sixth-largest breeding company. It sells over four million doses of semen per year.

The sperm provided by businesses may be from domestic, foreign, or dead bulls. The bulls chosen for artificial insemination become fathers at a little under two years of age. Their daughters' immunity against diseases, fertility, disposition, milking capacity and productivity, and structure are evaluated. The bulls' breeding value is, in turn, based on these evaluations.

A premium Holstein bull can have tens of thousands of daughters. In the 1980s, the problems of inbreeding became a concern. Genetic-assisted breeding helps monitor whether or not the variation in cattle DNA will decrease. Inbreeding means that an individual's parents are related to each other. Almost all cattle individuals are inbred on some level. A small amount of inbreeding is not a problem, and, according to an expert, being fertilized by a bull relative does not bother the cow at all. Inbreeding was common in the early years of breeding in the 1800s, because it was desirable for cattle herds to have uniform physical features. However, Holstein health has weakened, partly due to inbreeding, i.e. the narrowing of the gene pool.

People also implant embryos into cows. Cows from weaker stock are implanted with the offspring of better stock.

### 2005 UNITED NATIONS HUMAN CLONING DECLARATION

The United Nations bans the cloning of human embryos. The declaration is not binding.

### 1948 UNIVERSAL DECLARATION OF HUMAN RIGHTS

As a consequence of major wars between humans, and the associated acts of extermination, the United Nations declares that human rights belong to everyone. According to the Declaration, all people are equal and no one may be denied the right to life, liberty or personal security on the basis of race, colour, opinion, sex, age, religion, origin or other similar grounds. According to the Declaration, no one shall be held in slavery, or be subjected to torture or degrading treatment, and each person has a right to recognition everywhere as a person before the law. The declaration is not legally binding, but it is adopted into international law. The breeding of humans, carried out in the name of eugenics, is publicly condemned.

The Declaration reinforces the idea that, since all humans are human, different moral regulations apply to them than to other species. Because animals of other species are not human, breeding, forced sterilization, regulation of farbrates and so on are still allowed.

### 1970 FOETAL SCREENING

Human welfare improves, and the incidence of diseases caused by environmental factors decreases. In contrast, hereditary disorders become a significant medical and economic problem. Developments in clinical genetics allow researchers to test for abnormalities even before an individual is born.

Diagnostic tests on amniotic fluid are introduced in Finland in the 1970s. The first subjects are women with high-risk pregnancies, i.e. those in their 40s. Doctors study the woman's amniotic fluid to see if the foetus has any chromosomal abnormalities, or more specifically trisomy 21, i.e. Down syndrome. This syndrome is also called Mongolism, because it is thought that Down's people resemble the Mongols of Asia, and that Down's is a biological characteristic that can be traced back to these primitive people. This view is subsequently abandoned.

Doctors talk about preventing the birth of disabled and sick children. Screenings are justified by the economic savings they make possible. In the 80s and 90s, organizations for the disabled criticize the goals of the screenings. Doctors argue that the lives of a potentially disabled person and an existing disabled person are not comparable. There is a move away from preventing disabilities for its economic benefits to talking about helping families to avoid suffering. It is emphasized that the woman herself, and not healthcare professionals, should make the decision to end her own pregnancy.

Foetal screenings are defined as a life-preserving practice, because the majority of those participating in screenings are carrying healthy babies and continue with their pregnancies. The new rhetoric coincides with the screenings being extended to cover more pregnancies, since the majority of disabled children are born to unselected women. Serum screening is introduced, which reveals an increased probability of having a disabled baby, but without increasing the risk of miscarriage, as amniocentesis does. Nowadays, child healthcare centres offer serum screening to all pregnant Finnish women. Ultrasound is also used to detect foetal abnormalities.

Abortion because the foetus has a serious illness or physical deformity, such as Down syndrome, is permitted in Finland up to the 24th week of pregnancy. In 2012, there were 340 abortions due to foetal damage.

### 1968 ABORTION AND STERILIZATION LAWS ARE REFORMED

In Finland, researchers conclude that eugenics methods have no scientific basis and that the forced sterilization and abortion of humans have in no way improved the quality of the human stock. Forced sterilization is forbidden by law. The law on abortion is also reformed. The focus of regulation shifts from the parent to the unborn child. It is decided that a foetus can be aborted if it is potentially mentally handicapped, or if it has or will develop a serious physical disability.

### 2000 DESIGNER BABY

Humans discover how to manipulate the genetic traits of foetuses. This is deemed necessary if a sibling of the modified foetus suffers from a serious disease that can only be cured by a blood, marrow or organ transplant, and there are no other suitable donors. The first designer baby is called Adam. The same technology can be used for screening out unwanted genetic traits from embryos, and can take place either before or after the embryo is implanted in the womb. This technology also allows pretermination of the embryo's sex.

In 2002, a deaf lesbian couple in Maryland succeed in creating a deaf child through artificial insemination and embryonic screening. The parents say that deafness is part of their culture and is a deafness trait.

### 2001 THE FIRST HUMAN CLONE

The American biotechnology company ACT clones a human embryo with the intention of producing stem cells, but the embryo dies at the 6-cell stage. In 2013, a research group from the Oregon National Primate Research Center succeeds in cloning a human embryo that produces stem cells. This is called "therapeutic cloning" and is legal, as its aim is not to produce a new individual.

The use of human embryos in scientific research is regulated by law. In Finland, gamete donors must grant permission for their embryos to be used in research. Embryonic research cannot involve the cloning of a human or the creation of a person by combining two embryos or by crossing animal genes with human gametes. A human embryo cannot be kept for research for more than 14 days. The reason for these restrictions is that potential human life is a generally considered to merit respect.

The cloning of other animals is legal. Humans do tests with and clone, for instance, mice, rats, cattle, goats, pigs, rabbits, cats, deer, and a mouflon.

### 2006 THE HUMAN EGG-CELL MARKET

An estimated three million dollars' worth of egg cells are sold for fertility treatments in the United States. The donor has to be young and preferably beautiful and intelligent. Premium women are paid up to 30 000 dollars. They can keep the money for themselves. The woman is anaesthetized and her eggs are extracted. In Finland, egg donation is not very popular and not very well paid. Conversely, it is not compulsory.

### 2003 LAW ON THE STERILIZATION OF TRANSGENDER PEOPLE IN FINLAND

If a transgender person in Finland wants to be legally recognized as a representative of the gender they identify with, they must be incapable of reproducing.

### 2013 FINLAND'S FIRST 200-TONNE COW

Jella, a Holstein from Pielaves, yields over 200 000 kilos of milk a year. The 18-year old Jella, who has given birth fifteen times, breaks the EU's milking record with her 207 797 kilo production. Jella is the world's eighth 200-tonne cow. The upper limit on production is nowhere in sight.

### 2013 THE HOLSTEIN FAMILY REIGNS IN THE CATTLE KINGDOM

There are an estimated 250 million milking cows in the world. The majority of registered individuals are either Holsteins or Holstein crosses. The breed is originally from Holland, but most contemporary Holsteins come from North America. Of the over nine million milking cows in the USA, 90 percent are Holstein crosses. The popularity of this breed is based on its superior productivity. Unfortunately the cows only maintain their high productivity rate for an average of 2.2 lactations, so their lives are ended at about five years of age. At her best, a Holstein cow produces over 20 000 kilos of milk per year. The world record (in 2010) is over 30 000 kilos. Special attention was paid to size in their breeding, and so Holsteins are truly massive.

### BREEDING DISPOSITION

Humans claim to have bred the temperament of Ayrshires and Holsteins: they are considered more peaceful, less curious and less reactive, and should therefore be easier to handle than Finncattle or other original breeds. Some even call them apathetic. There is a question as to what degree temperament is due to hereditary or environmental factors. The behaviour of Ayrshire cows is largely affected by their size, an average of 570 kilos. They legs cannot always support all this weight. Highly productive individuals, i.e. those that produce 50 kilos of milk per day, can suffer from production stress. They have to eat and drink enormous amounts, and their heat production increases. It is as if they were constantly running a marathon, which is a sport invented by humans. Extremely unstimulating surroundings presumably also affect their state of mind. Some cows spend their entire lives with their heads chained to a beam. In herds all cattle form hierarchies, in which some are stronger and do what they please, while others take second place. When the individuals know each other well, their ranking is evident in even the smallest, almost imperceptible gestures. Some cattle like humans, but by no means all of them do.

## 2013 POPULATION

There are 1.3 billion bovine and 7.1 billion human individuals in the world.