

FACTSHEET: FARM ANIMAL CLONING

BACKGROUND

The first mammal cloned from an adult cell was Dolly the sheep in 1996. The process that created Dolly is called somatic cell nuclear transfer (SCNT). Since then, many other species have been cloned using SCNT, including cow, pig, goat, horse, mule, dog, cat, rabbit, mouse, rat, deer, buffalo, camel and ferret. Today there are many thousands of farm animal clones worldwide.

The SCNT process involves removing the nucleus (which contains the DNA) from an egg cell and replacing it with the nucleus from a body cell taken from the source (or “donor”) animal. This can be done by injecting the nucleus into the empty egg cell or by fusing the egg cell with its new nucleus via an electrical pulse and activating it to develop into an embryo. The embryo is then implanted in the uterus of a ‘surrogate’ mother animal. If the pregnancy is successful, the offspring that is born will be a clone of the source animal.

Cloning technology is already being used commercially in some parts of the world for the replication of elite breeding animals, mostly cattle and also pigs, who are used to produce animals farmed for food production. Food from clones and their offspring is not yet on sale in the European Union but food products from the offspring of cloned animals have already entered the human food chain in the United States and some Asian countries and we know that semen from clones is being imported into the European Union (EU).

Outside of the EU, cloning of animals for food production is going ahead rapidly in several countries, as well as cloning of high quality horses and animals used for entertainment such as a fighting bull cloned in Spain. In 2015, the Chinese company BoyaLife announced that in partnership with the Korean company Sooam Biotech, they were planning to build a factory in Tianjin, China, to produce 100,000 cloned cattle per year, starting in 2016, to supply China's growing market for quality beef. (<http://www.boyalifegroup.com/english/news31.htm>)

WELFARE ISSUES

Cloning has very serious consequences for animal welfare, both as a direct result of the technology and through exacerbation of the health and welfare problems caused by selective breeding for high productivity. Further welfare concerns arise because the SCNT process can also be used to facilitate the development of genetically modified animals for food production purposes.

Welfare of clones

The cloning process is inefficient. The large majority of cloned embryos fail to develop normally and die before the pregnancy reaches term. Dolly was the only clone to be born live out of a total of 277 cloned embryos implanted in surrogate mothers. For those that survive to delivery, a significant proportion of the animals die during or shortly after birth, or at various times over

Updated March 2016

the following days and weeks of life from cardiovascular failure, respiratory problems, liver or kidney failure, immune system deficiencies or musculoskeletal abnormalities. Up to 22% of cloned calves, 25% of cloned piglets and 50% of cloned lambs die before weaning.

Clones may be born unusually large and with a range of health problems, termed 'large offspring syndrome' (LOS). This is a common problem in cattle and sheep clones and is associated with increased mortality, abnormally large foetal size, abnormal placental development, enlarged internal organs, increased susceptibility to disease, reluctance to suckle, difficulty in breathing and standing and sudden death. LOS was first described in pregnancies with *in vitro*-fertilised embryos but it is much more common in clone pregnancies. In contrast to cattle and sheep clones, cloned piglets are more likely to suffer growth retardation during development, resulting in low birth weight and increased mortality.

Welfare of surrogate mothers

The welfare of animals used as surrogate mothers is also adversely affected. A large proportion of clone pregnancies fail, mainly due to abnormalities of the placenta. For those pregnancies that make it to term, the birth is often difficult and delivery is commonly by Caesarean section. The Caesarean can cause pain and anxiety for the animal and often they will not be provided with adequate pain relief following the operation.

Welfare of clone offspring

From the limited data available, it appears that the offspring of cloned animals do not suffer from any obvious abnormal effects. However, cloning is used commercially for the replication of elite, high-yielding animals for breeding purposes. Such animals already suffer from a range of serious health and welfare problems associated with selection for high productivity, such as increased levels of lameness, mastitis and infertility in dairy cows, lameness and calving difficulties in beef cattle, lameness and cardiovascular disorders in pigs. The European Food Safety Authority (EFSA) has concluded that "*genetic selection for high milk yield is the major factor causing poor welfare in dairy cows*".

The use of cloning in commercial livestock breeding is therefore likely to accelerate the spread of genetics that are associated with poor welfare, leading to greater suffering from health and welfare problems connected with fast growth and high yields.

CLONING AND GENETIC ENGINEERING

Cloning animals is a mechanism for producing exact physical copies of an existing animal. Genetic engineering generally involves the introduction of genetic material from a different species, sometimes human, into the DNA (genetic makeup) of an animal.

For example, animals are being genetically engineered in research facilities to increase the animals' rate of growth. Pigs, sheep and salmon engineered with growth hormone genes have been born with gross skeletal deformities and enlarged organs. Many die shortly before or after birth.

Cloning is attractive to the biotechnology industry as, once a genetically engineered animal has been produced, the simplest way of making multiple copies of that animal is by cloning. Cloning will facilitate the genetic engineering of animals, a process that leads to great suffering.

OTHER CONCERNS

There are a number of other serious concerns associated with farm animal cloning, including a threat to the genetic diversity of the world's farm animals as well as food safety and ethical concerns.

Threat to livestock genetic diversity

The diversity of the world's farm animals is currently shrinking. The global spread of a small number of specialised breeds has been facilitated by the development of artificial reproductive technologies, particularly artificial insemination. Some suggest that cloning technology could be used to replicate individuals of rare and endangered livestock breeds, which could help to preserve genetic diversity. However, the commercial use of cloning to replicate elite breeding animals is likely to further contribute to the erosion of genetic diversity in farm animal breeds.

Reduced genetic diversity increases the susceptibility of farm animals to diseases and other risk factors. This raises the possibility of large numbers of animals succumbing to diseases to which they are susceptible, with potentially serious animal welfare, social and economic consequences. Cloning large numbers of identical animals can only add to this problem.

Food safety and consumer concerns

Risk assessments carried out by the European Food Safety Authority and the US Food and Drug Administration suggest that products from cloned animals and their offspring are unlikely to carry increased food safety risks compared with conventional food products. However, there are limited data available and further studies, including long-term trials, would be needed to rule out any potential food safety issues from the consumption of products from cloned animals and their offspring.

Surveys of public attitudes to cloning in the EU and US show that most people do not agree with farm animal cloning. The majority of EU and US citizens state that they are opposed to animal cloning for food production purposes. The majority of EU citizens state that they would be unlikely to buy products from cloned animals or their offspring, even if they were shown to be safe. If food products from clones or their offspring were to become available in the EU, the vast majority of EU citizens believe that special labelling should be required.

A number of farmers' groups, for example in The Netherlands, Italy and New Zealand, have expressed concern at the threat to the image of the livestock industry if products from cloned animals or their offspring are permitted to enter the food chain, potentially leading to a loss of consumer confidence and associated economic consequences.

Feeding the world?

Some argue that cloning animals would help feed the world. In fact, the higher yielding animals produced by cloning would not be an efficient way of feeding the growing world population since high yielding animals are fed on cereals. These crops could feed more people if they were used for direct human consumption rather than being fed to animals. The most efficient way of rearing cattle is to let them graze at pasture eating grass (with perhaps just a little supplementary feed). This way they are converting something we cannot consume, grass, into meat and milk that we can eat. This is best achieved using robust naturally bred animals.

EXPERT OPINION ON FARM ANIMAL CLONING

A number of official advisory bodies have spoken out against the cloning of animals for food. The European Food Safety Authority Scientific Committee states: *"The health and welfare of a significant proportion of clones, mainly within the juvenile period for bovines and perinatal period for pigs, have been found to be adversely affected, often severely and with a fatal outcome."*

The European Group on Ethics in Science and New Technologies (EGE) concludes: *"Considering the current level of suffering and health problems of surrogate dams and animal clones, the EGE has doubts as to whether cloning animals for food supply is ethically justified... At present, the EGE does not see convincing arguments to justify the production of food from clones and their offspring"*.

REGULATION OF FARM ANIMAL CLONING

Following the decision by the US Food and Drug Administration in 2008 that products from cloned animals are safe, food from clones and their offspring can freely enter the marketplace in the US and there is no requirement for these products to be labelled. In the EU, industry organisations like the European Forum of Farm Animal Breeders (EFFAB) are lobbying **against** a ban on the use of descendants of clones.

At present, there is no specific legislation governing farm animal cloning in the EU. In September 2008, the European Parliament (EP) adopted a resolution calling for a ban on:

- The cloning of animals for food supply purposes;
- The farming of cloned animals or their offspring;
- The placing on the market of meat or dairy products derived from cloned animals or their offspring;
- The importing of cloned animals, their offspring, semen and embryos from cloned animals or their offspring, and meat or dairy products derived from cloned animals or their offspring.

The main concerns cited by the Parliament were threats to animal welfare, genetic diversity, consumer confidence and the image and substance of the European agricultural model.

In spite of the EP's vote, the European Commission and the Council of Ministers (from all the Member States of the EU) were unable to reach an agreed position during a conciliation meeting in 2011.

In 2013, the European Commission issued a new draft Directive on cloning. It says:

"Member States shall provisionally prohibit:

(a) the cloning of animals;

(b) the placing on the market of animal clones and embryo clones."

This would be reviewed in five years from the time of its adoption.

It has also published a draft Directive on the Marketing of Food from Clones, which says:

"Member States shall ensure that food from animal clones is not placed on the market.

Member States shall ensure that food of animal origin imported from third countries where

Updated March 2016

food from clones can be legally placed on the market or exported is only placed on the market of the Union according to any specific import conditions adopted under Articles 48 and 49 of Regulation (EC) No 882/2004 of the European Parliament and of the Council, ensuring that no food from animal clones will be exported to the European Union from these third countries.”

This would be reviewed in five years from the time of its adoption.

Both these draft Directives totally fail to address the issue of the descendants of clones. The issue of labelling is also not addressed.

In response to these draft Directives, in 2015 the EP voted again overwhelmingly against cloning. MEPs adopted the MOI/SOMMER report by 529 votes to 120 (57 abst.) It in effect bans:

- The carrying out of cloning in the EU;
- The use of clones and their descendants in EU farming;
- The sale of meat or milk from clones or their descendants;
- The Parliament also voted to turn the Directive into a Regulation, which means that it would apply to all Member States (MS) without need for further legislation; it also extended the ban to all species of animals used in farming.

It is vital that the Member States support the Parliament’s position, not that of the Commission. Compassion in World Farming is calling on the Council of Ministers to follow the Parliament’s wishes and implement a ban.

LABELLING AND TRACEABILITY

Both the Commission in its 2010 report and the Council in 2011 proposed that food from clones should not be placed on the market and did not appear to foresee any difficulty in identifying such food. EU law already requires cattle, pig and sheep semen and embryos from third countries to come from identifiable donor animals.

Additionally, existing EU law, Article 18 of Regulation 178/2002, says: *“The traceability of food, feed, food-producing animals, and any other substance intended to be, or expected to be, incorporated into a food or feed shall be established at all stages of production, processing and distribution”.*

However, a Report written by ICF International for DG Agri and published early in 2016 foresaw that a clone offspring labelling obligation would trigger additional operating costs in the order of €10 billion per year if a DNA verification system were required, and around €800 million per year in the absence of such a system. The majority of the €10 billion annual cost (78%) would be incurred in the pig sector, 13% in the sheep sector, 6% in the bovine sector and the remainder in goat and horse production. (The cattle sector already requires a high degree of traceability.)

Products such as milk or mince, where products from many different animals are mixed together, would need batch segregation and identification.

Interestingly, existing EU law, Article 18 of Regulation 178/2002, says: *“The traceability of food, feed, food-producing animals, and any other substance intended to be, or expected to be, incorporated into a food or feed shall be established at all stages of production, processing and distribution”.*

Updated March 2016

THE FOOD INDUSTRY

A survey published in 2016 showed that only 11% of 90 food companies surveyed had made a firm commitment not to sell products from cloned or genetically modified animals.

COMPASSION IN WORLD FARMING'S POSITION ON CLONING ANIMALS FOR FOOD.

Compassion in World Farming is:

- **Against carrying out cloning of farm animals in the EU *but also***
- **Against the use of the descendants of clones in EU farming;**
- **Against the sale of meat and milk from clones and their descendants;**
- **Against the import into the EU of clones and their descendants, sperm, oocytes and embryos from clones and their descendants, and food from clones and their descendants.**

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Updated March 2016

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March 2016

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