CLONING AND GENETIC ENGINEERING OF ANIMALS FOR FOOD PRODUCTION

A major threat to animal health and welfare

Scientific research shows that cloning and genetic manipulation (GM) entail serious health and welfare problems for cloned and GM animals as well as for the surrogate mothers who carry them to birth.

Cloning and GM would take agriculture in the wrong direction, perpetuating industrial farming. This involves the use of animals selected for such high yields and growth rates that they are vulnerable to damaging health problems. Cloning and GM are out of step with the growing recognition of the need to respect animals as sentient beings.

NEW REPORT

To gain the most up-to-date knowledge on the production and use of cloned and genetically-engineered animals, Compassion in World Farming commissioned a report by animal welfare experts, Professor Don Broom and Dr Richard Kirkden from Cambridge University[1]. The report, *The Welfare of Genetically Modified and Cloned Animals Used for Food*, provides a comprehensive assessment of recent work in this field*.

The full report shows that:

- high rates of pre- and post-natal mortality and poor health are common in cloned cattle and sheep
- the health problems experienced by these animals include breathing difficulties, heart function insufficiency, kidney problems and an increased susceptibility to infectious disease
- the production of genetically-engineered animals can also involve the suffering and death of many animals.

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CLONING

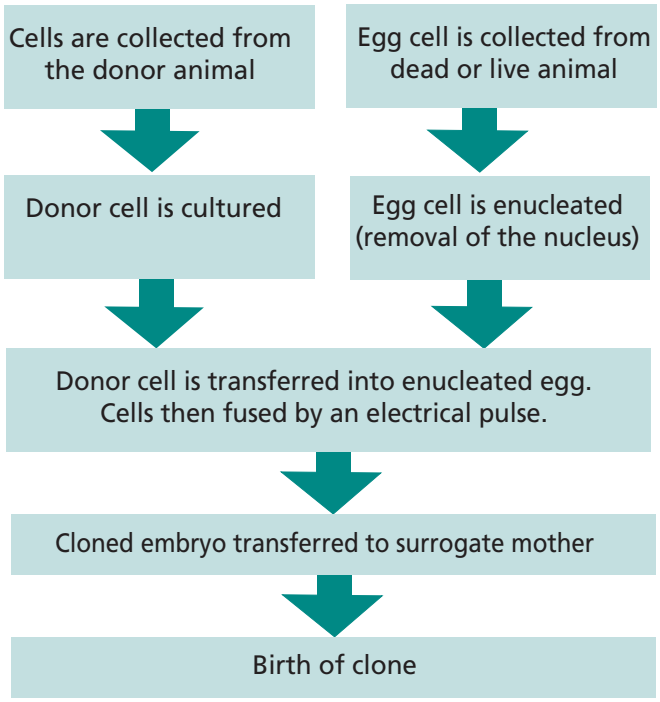
Cloning aims to produce genetically identical copies of an animal.

The cloning process

The most commonly used procedure is somatic cell nuclear transfer (SCNT). This involves collecting a cell from the animal that is to be cloned (the 'donor cell') and removing an egg cell from another animal. This cell is enucleated, i.e. its genetic material is removed. The donor cell and the egg cell are then fused by an electrical pulse and from this a cloned embryo is developed. This is implanted into a surrogate mother (dam).

In sheep and pigs, the transfer of the embryo into the surrogate mother is performed by a surgical procedure. In cattle, embryo transfer is sufficiently stressful that UK legislation requires a general or epidural anaesthetic.

Process of cloning by somatic cell nuclear transfer



Impact on health and welfare of surrogate dams

The European Food Safety Authority (EFSA) states that there is an increase in pregnancy failure in cattle and pigs who are carrying a clone and increased frequencies of difficult birth, especially in cattle[2]. This, together with the increased size of cloned offspring, makes Caesarean sections more frequent in cattle carrying a clone than with conventional pregnancies.

Impact on health and welfare of clones

EFSA has concluded: **"The health and welfare of a significant proportion of clones ... have been found to be adversely affected, often severely and with a fatal outcome[3]."**

Most cloned foetuses die during pregnancy or birth. Only 6-15% of cloned cattle embryos and about 6% of pig embryos are born alive[4]. Many of these die early in life from problems such as cardiovascular failure, respiratory difficulties and defective immune systems. Of those born alive, up to 22% of cloned calves, 25% of cloned piglets and 50% of cloned lambs die before weaning[5].

This cloned gaur calf lived for just 48 hours before dying from an infection.**

European Group on Ethics

The Opinion of the European Group on Ethics (EGE) in Science and New Technologies concluded that: **"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[6]".**

Use of offspring of clones on-farm

Clones will primarily be used as elite breeding animals. It is their offspring that will be farmed for meat or milk.

The likelihood is that cloning will primarily be used to produce copies of the highest yielding dairy cows and fastest growing pigs. However, traditional genetic selection has already led to major health problems for such animals. EFSA has concluded that ***"genetic selection for high milk yield is the major factor causing poor welfare, in particular health problems, in dairy cows[7]"*** and that genetic selection of pigs for rapid growth has led to leg disorders and cardiovascular malfunction[8]. The use of the offspring of clones on farms is likely to entrench the use of animals chosen for extreme production traits and risks perpetuating the health problems associated with such traits.

Is the incidence of pathologies and mortality declining?

Some researchers claim they are managing to reduce the incidence of ill-health and mortalities involved in cloning. A considerable body of evidence suggests that this is not the case.

In 2012 EFSA stated that no new information has become available that would lead it to reconsider the conclusions in its 2008 Opinion on the animal health and welfare aspects of cloning[9]. Unacceptable death rates of the animals involved have forced AgResearch, a leading New Zealand research organisation, to end its SCNT cloning trials[10]. A Japanese survey revealed that survival rates of transferred cloned bovine embryos and cloned calves had not improved – indeed had deteriorated - over a decade (1998–2007)[11].

GENETIC ENGINEERING

Farm animals are being genetically engineered for various purposes including enhanced growth rates, increased disease resistance and altered meat and milk composition.

Genetic engineering involves the insertion into an animal of genes from another species or extra genes from the same species. Alternatively it can entail the manipulation or knocking-out of an animal's own genes.

Enhanced growth rates

Animals that have been genetically engineered for faster growth have suffered from harmful side-effects. The production of fast-growing GM animals is most advanced in the case of farmed fish. This has led to deformities, feeding and breathing difficulties, reduced swimming abilities and lower tolerance to disease[12].

Increased disease resistance

Conferring improved disease resistance on animals appears to be benign. However, the UN Food and Agriculture Organization points out that industrial livestock production plays an important part in the emergence and spread of diseases[13].

The proper way to address such diseases is to keep animals in less intensive systems. Good hygiene, husbandry and housing rather than genetic engineering should be used to prevent the diseases that stem from factory farming.

Altered meat and milk composition

Researchers point to the health benefits of tackling rising levels of obesity and cardiovascular disease in humans by genetically engineering animals to produce lower levels of saturated fats and higher levels of beneficial omega-3 fatty acids. However, the incidence of these problems can be reduced by improving our diet. A major study concluded that a 30% decrease in intake of saturated fats from animal sources in the UK could reduce heart disease by 15%[14]. Reduced levels of saturated fat and improved levels of omega-3 fatty acids can be achieved by replacing factory farmed chicken and grain-fed beef with free-range chicken (especially slower growing breeds) and pasture-fed beef[15].

POLICY RECOMMENDATIONS

In light of the adverse impact of cloning and GM on animal health and welfare, cloning and GM animals should not play any part in European farming.

THE EU SHOULD PROHIBIT:

- **the cloning or genetic engineering of animals for food production**
- **the use of clones, GM animals and their offspring in the EU; this will make it pointless to import semen and embryos of clones and GM animals**
- **the sale of food from clones and GM animals**
- **the sale of food from the offspring of clones and GM animals. At the very least, such food should be labelled.**

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WSPA World Society for the Protection of Animals

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** The gaur species, *Bos gaurus*, is classified as vulnerable on the IUCN Red List of Threatened Species.