FARM ANIMAL GENETIC ENGINEERING AND CLONING

An overview of the issues

COMPASSION IN WORLD FARMING TRUST
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Text only version

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Farm animal genetic engineering and cloning

Setting the Scene

Organic farming is growing apace. Many of the cruellest factory farming systems, such as narrow veal calf crates, are either already banned in the UK or being phased out in the EU. Radical reform of the Common Agricultural Policy (CAP) to embrace environmental and animal welfare concerns is a serious possibility. The agricultural picture is getting rosier – or is it?

Compassion in World Farming Trust believes that these welcome and tangible agriculture reforms are under threat from an insidious new technology – farm animal biotechnology. Biotechnology is being applied to millions of animals in laboratories worldwide. Whilst the aims of some of this research is to use farm animals' bodies for production of spare organs for humans or for production of pharmaceuticals or industrially useful proteins in the animals' body fluids or eggs, other research is directed solely at the farm. This research aims to produce animals genetically engineered to grow faster or leaner or to produce more milk or specialised milk, for instance, good for making cheese. Cloning research aims to reproduce identical 'high quality' animals or animals whose identical bodies make butchery and marketing easy to standardise. Cloning technology is also an enabling technology for reproducing multiple copies of genetically engineered animals – a high tech solution to a high tech failure – as current GM animal technologies are 99% inefficient.

These new biotechnologies are dependent on breeding methods which are seen as high tech in themselves, for example, embryo transfer from one animal to another – but which are, in fact, cumbersome and highly invasive and distressing for the animals involved.

Inefficiency

It is hard to think of any other science which is so hit-and-miss being regarded so indulgently by regulators and investors alike. Yet genetic engineering of farm animals has stayed, for the last decade, at a success rate per experiment of approximately 1%. In cloning experiments, success rates also run at around 1%, with pre-natal death and early mortality of newborn clones running at around 50%. The news of the onset of arthritis in Dolly, the first sheep cloned from an adult cell, raises further questions about the long term viability of the cloned animals which do survive.

Funding and Investment

Biotech researchers in both academia and commerce appear to have been successful in getting approval, publicity and consequent investment in their work by:

- Hyping up the possible benefits to human health of organs/products from genetically engineered/cloned farm animals (none yet approved or successfully functioning);
- Being quick to call in the cameras to publicise the few 'successful' cloned or genetically engineered animals they have produced – often without waiting for publication in a peer-reviewed science journal – the normal route in all other areas of science. A corollary of this is the dearth of public information on the possibly millions of animals used, damaged or killed in the 'unsuccessful' experiments – many of which appear to be quietly forgotten and never published. It is always wise to remember that the xenotransplant market alone has been estimated to be worth $5 billion.

Harm to Animals

One view of the use of animals in genetic engineering is that there is a level of harm to the animal beyond which one should not go. (Banner[1], Kennedy[2])

This is hardly a controversial view – but one which would likely engender wide public support. Let's look at some of the recent published genetic engineered/cloning experiments and see what 'harms' they may have caused.

- 80 cloned and genetically engineered lamb embryos were implanted in 42 ewes. Only three surviving lambs were produced.[3]
- Cloned sheep with a deleted gene were produced in Scotland by putting 120 embryos into 70-80 ewes. Of eight lambs born, only four were live and all died within two weeks.[4]
- Of 110 cloned, transgenic calf embryos transferred into 12 cows, three cows died during pregnancy, five foetuses aborted or were stillborn and eight calves were live born, two of whom died from heart and lung problems. All calves had to be given oxygen to aid survival.[5]
- Of seven cloned 'knockout' piglets designed for xenotransplants reported in January 2002, three died within 17 days and a total of four had respiratory or heart abnormalities.[6]

CIWF Trust believes that the levels of animal wastage and suffering involved in these kinds of experiments are not acceptable under the criterion of limiting harm to the animal. They are certainly not acceptable when viewed from the point of view of animal welfare or health.

Breeding Technologies

Every time scientists want to produce a batch of genetically engineered or cloned animals, many female animals are required as surrogate mothers or sources of eggs. Usually female animals are induced, via hormonal injections and vaginal sponges (for sheep), to super-ovulate i.e. produce far more egg cells than normal at one time. These are either extracted by abdominal surgery or trans-cervical suction.

Once the genetic engineering or cloning, or genetic engineering and cloning, have taken place in the laboratory, the embryos are then implanted, usually by surgery, into surrogate mother females, who have also received hormone injections/sponges to synchronise their cycles. Sometimes this first batch of surrogates are killed after a week, the embryos extracted and screened for growth and viability. The successful ones are then implanted into a final group of surrogate females who bring them to term.

In fact, there is a high failure rate even at this stage, with many females suffering miscarriages. Cloned foetuses tend to grow excessively large in the uterus and are usually born by caesarean operation. This is such an unfailing occurrence, it is now known as 'large offspring syndrome'.

This required level of surgical interference, and likely level of miscarriage and caesareans, plus the killing of unwanted 'spent' females, adds to the catalogue of welfare concerns about farm animal biotechnology.

Ends and Means

But can the end justify the means? Will those new farm animal biotechnologies revolutionise the organ transplant scene, produce badly needed pharmaceuticals and create a new viability for farming?

CIWF Trust believes the likely answer to these questions is 'no'.

There have, as yet, been no medically/commercially approved products of the 'pharm', although the technology has been around for over a decade. The products being trialled in genetically engineered animals' milk could be – or are already – produced by alternative methods such as bacterial cultures, mammalian cell cultures or plants. Without suffering.

Four years ago, the Government established the UKXIRA (UK Xenotransplant Interim Regulatory Authority) to oversee the development of xenotransplantation. In its third annual report, published in 2000, it concluded that "the likelihood of whole organ xenotransplantation being available within a clinically worthwhile timeframe may be starting to recede."[7]

It suggested that heart-assist devices and tissue engineering might be more fruitful avenues to explore.

UKXIRA presumably came to these conclusions after serious consideration of all the xenotransplant experiments done to date. Yet what those experiments show is that primates, such as cynomolgus monkeys, have been operated on to receive genetically modified pig organs and have all died after days, or weeks, of quick or slow organ rejection and after being given massive doses of drugs to suppress their own immune systems (to prevent rejection of the 'foreign' organ). These drugs have been given in quantities that have either irritated the animal's digestive tract to excess or have made it totally vulnerable to infection.

Both UKXIRA and its predecessor, the 'Kennedy' Committee, have raised concerns over the transfer of viruses such as Porcine Endogenous Retrovirus (PERV) to humans from pig organs. The threat of a new viral epidemic arising out of xenotransplantation has been taken seriously, with UKXIRA even calling in its draft guidelines for 'detention' for testing of the population, should a pig virus spread into humans via an organ transplant.

But could farm animal genetic engineering/cloning revolutionise farming – bring back profitability to livestock farmers who have been hit by BSE, swine fever, FMD – not to mention salmonella, E-coli, campylobacter etc.? We think not. Consumers are becoming far more conscious of food quality and safety. They want to know where their food has come from and how it has been produced. Hence the huge move towards organic products right across the board. The retail trade or the researchers may convince themselves that consumers want identical pork chops and lamb shoulders – and these would be so easily achieved with the identical clones – but the truth is that once consumers were aware of how these animals had been produced and why they were so identical, the products would be rejected.

Many people are still unaware of the reality of the factory farm and believe the childrens' story book version of what the average farm is like. Consumers who see for themselves TV pictures of the factory farm are often shocked and change their eating habits to free-range/organic – or even give up meat products altogether. We have no doubt that if consumers felt that their meat was being in a sense 'manufactured' by laboratory-type intervention in farm animals' lives, they would be appalled and reject it out of hand.

CIWF Trust is not 'anti-biotechnology'. Scientific progress may have much to offer the farm on health and welfare. But, the current applications of biotechnology to farm animals are absolutely unacceptable on welfare terms.

As an organisation dedicated to promoting farm animal welfare, CIWF Trust is calling for:

- **an immediate moratorium on all experimental and commercial use of GM or cloned farm animals. This is the only way we can halt their suffering NOW.**
- **The establishment of an Animal Welfare Committee, to advise government on ethical matters regarding all uses of farm animals**

References

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