GMOs & Farm Animals

An overview

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in collaboration with
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For many people, concern about genetic engineering in food, is rooted in a deep sense that humans have a duty of care to the earth, to the environment, to the future and to each other.

The creation of genetically modified (GM) plants presents several challenges to that duty of care. The use of genetic engineering to feed and breed our farm animals takes those challenges to an entirely new level.

Most people in the UK are unaware that the majority of conventionally reared animals that provide us with meat, milk and eggs are reared on GM feed. This is the most common way that genetically modified organisms (GMOs) slip into our shopping baskets without us knowing about it.

For many years, UK supermarkets complied with their customers' wishes and maintained strict policies for sourcing meat, milk and eggs that did not come from animals raised on GM feed. But since 2013, UK supermarkets have gradually – and not very transparently – changed their policies.

Why does it matter?

The issue of GM-fed animals speaks to the heart of consumer choice. Survey after survey has shown that UK consumers want to know what is in their food.

The GM soya and maize fed to farm animals is clearly labelled when it arrives on the farm, and supermarkets will know if suppliers are giving GM feed to their animals.

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But there is no regulation requiring food products from these animals to be labelled. In fact, the only way to guarantee non-GM fed animal foods is to buy organic, since organic standards strictly prohibit the use of GM feed.

There are also implications for the health of farm animals raised on this type of feed.

Feeding animals on GM grains is integral to the industrial livestock system which values 'yield' – the amount of food that can be produced from each animal – above everything else.

If 'yield' is the only measure of farming success, then intensive livestock production can claim to be uniquely successful.

But farm animals bear the brunt of this dominant factory-style food system. More often than not it means they are raised in filthy, crowded and cruel conditions where their health and wellbeing is severely compromised.

The natural diet of farm animals is grass and forage – not the grains used in factory farms. Grain-based diets can produce serious and sometimes fatal digestive tract problems in cows, goats and sheep whose stomachs are best suited to digesting high-cellulose containing plants like grass.

Reports from farmers suggest that GM feed makes the problem worse. For instance, in his evidence to the 2016 Monsanto Tribunal at The Hague, Danish pig famer Ib Borup Pederson noted that feeding his pigs on GM feed induced poor digestive health, fatal diarrhoea, malformations and reproductive disorders.

Switching to a non-GM feed resolved these issues.

Uncertainties for human health

Several studies have shown that when livestock consume GM feed, some GM material makes its way into the foods consumed by humans.

As a result, in 2012 the UK Food Standards Agency (FSA), having previously denied this possibility, was forced to concede: “DNA fragments derived from GM plant materials may occasionally be detected in animal tissues, in the same way that DNA fragments derived from non-GM plant materials can be detected in these same tissues.”

What is not known is whether these fragments of genetically engineered DNA are in any way active in the human body – for instance, whether they might be able to trigger allergic reactions. At present there is very little research being done in this area.

It’s not just the maize and soya in animal feed that is genetically engineered. Supplemental vitamin B2, an important additive in the feed of factory-farmed animals, is made from GM bacteria. It's approved for use because, according to its manufacturers, no GM bacteria remains in the supplement.

But recently, European authorities found that not only was there live bacteria in some B2 supplements

for livestock, it also carried resistance to antibiotics which could then be transferred to the animals.

The contaminated supplement has been withdrawn, but while it was on the market regulators admitted its use had added to the escalating problem of antibiotic resistance in the EU.

There are better choices

Supermarkets often respond to consumer concerns by saying there is not enough non-GM feed to meet the needs of farmers in the UK.

Non-GM soya producers around the world, however, claim there is plenty available, and at a competitive price. In China and India, for example, 100% of soya production is non-GM and experts say there is enough to meet all of Europe's needs.

In Germany supermarkets have forced the German Poultry Association to return to using non-GM feed.

The decision was made after it became clear that there is enough non-GM Brazilian feed to meet demand, and that this supply is increasing.

In the UK, with the exception of Waitrose, where own-brand animal foods are fed on sustainable non-GM soya, there is little impetus for change.

GMO animals – the 'hard sell'

But the issue of genetic engineering in farm animals goes much deeper than what animals eat. Biotech companies are actively pursuing an agenda to re-engineer farm animals for a variety of purposes; and are using a 'hard sell' to regulators and the public to extol possible benefits of these animals.

Under the banner of protecting the climate, there are cows and other ruminants being re-engineered to produce less methane.

Under the banner of animal welfare, animals are being re-engineered to cope better with unnatural and inhumane conditions on industrial farms.

Mutilation, for instance, is common practice on industrial livestock farms: cows are de-horned, piglets and lambs are tail-docked, while hens and turkeys have their beaks-trimmed. To address this cows are being genetically engineered to grow without horns, and pigs to grow without tails.

Chickens and pigs are also being engineered to be immune to certain viral infections which arise directly as a result of living in crowded factory farm conditions.

Under the banner of 'feeding the world' a whole

GMO Salmon

A fast-growing fish swimming against the tide of sustainability

Currently there is only one genetically engineered animal approved for human consumption: the AquaAdvantage farmed salmon, which has been engineered to grow twice as fast as natural salmon.

The fish is engineered using DNA from three different animals: Atlantic salmon, deep water ocean eelpout and Pacific Chinook salmon. It is now on sale in Canada and is soon to be sold in the US.

Salmon farming has been proven to be a polluting, inhumane and ultimately unsustainable business.

The confined space of a tank is not well-suited to Atlantic salmon, which in the wild can grow to 26kg and are used to swimming freely over long distances.

Farmed salmon are also fed on fish meal that can include GMO grains and protein and oils from smaller marine organisms (e.g. krill, shrimp, anchovies) unsustainably harvested from the sea.

The company behind the GMO fish claim that its land-based tanks improve welfare by removing the possibility of sea lice infestation. But even if they aren't prone to lice, data shows the fish suffer high rates of malformations and problems such as jaw erosions, inflammation and higher mortality rates.

The quality of the meat also differs – studies show it is higher in total fat but lower in beneficial omega-3 fatty acids, and in protein, than natural salmon. It has also been shown to have higher levels of potential allergens and carcinogens.

Regulating genetically engineered animals is complex and in the US, for example, loopholes in existing regulations were exploited to expedite approval of the fish. So, while the FDA considers the salmon to be 'substantially equivalent' to natural salmon, the way it is engineered comes closer to the definition of a drug. Thus, in the US the fish was eventually regulated as a veterinary drug.

The fish carries no warning label, so retailers, restaurants and consumers have no way to tell if they are eating the genetically engineered salmon.

The company producing the GMO salmon is now developing fast-growing GMO trout and tilapia.

range of farm animals are being re-engineered to grow faster and produce more meat, milk and egg while consuming less feed.

Many of these animals are still in the experimental stage – in other words they have not been approved for human consumption.

But recently the first genetically engineered animal intended for human consumption – a fast growing salmon – was approved for sale in the US and Canada with no labelling requirements.

The new age of 'pharming'

At the extreme end of the scale, some farm animals are being re-engineered and repurposed entirely to become living bioreactors for producing a variety of medicines for humans.

Worldwide, there are ongoing experiments with genetically engineered animals – some of which are being designed as living, breathing bioreactors for producing drugs at industrial scale in their milk, eggs, blood and urine. This is known as 'pharming'.

Biotech companies are actively pursuing an agenda to re-engineer animals for a variety of purposes.

The first commercial drug produced in this way, ATryn, an antithrombotic derived from the milk of genetically engineered goats, was approved in 2009.

In 2014, the US Food and Drug Administration (FDA) approved Ruconest, a drug collected from the milk of genetically engineered rabbits and used to treat hereditary angioedema.

In 2015 the FDA approved a genetically modified chicken that makes a drug called Kanuma, used to treat lysosomal acid lipase deficiency – a rare genetic condition that prevents the body from breaking down fatty molecules inside cells.

There are also experimental cows genetically engineered to produce human antibodies.

The advantage, say biotech companies is, low production costs. Once the animal is reengineered it can simply keep pumping out drugs for the cost of maintaining chickens and goats in cages and pens.

Adding to welfare concerns

With GM animals (sometimes referred to as 'gene-edited' animals), there can be unpredictable adverse effects on growth and reproduction – effects that can significantly impact welfare and wellbeing.

Recently, when Chinese researchers engineered rabbits to make them meatier, the animals developed enlarged tongues; similar experiments on pigs led some to develop an additional vertebrae. Sheep gene-edited to produce a particular colour of wool had more spontaneous abortions; calves in Brazil and New Zealand, genetically engineered to reduce heat stress, died prematurely.

These kinds of problems aren't unique to genetically engineered animals.

The European Food Safety Authority (EFSA) notes, for instance, that "long term genetic selection for high milk yield is the major factor causing poor welfare, in particular health problems, in dairy cows".

Breeding hens to produce more and more eggs causes osteoporosis creating a substantial risk of fractures, as well as lameness. Likewise, breeding pigs for rapid growth leads to leg disorders and cardiovascular malfunction.

What genetic engineering adds to the mix is the deeper entrenchment of a factory farming system that is not fit for a humane and sustainable future.

A sustainable future?

The genetic engineering of farm animals brings with it inescapable questions about sustainability: what we think that is, how much or how little we are willing to retreat from the infinite growth model of business and how much or how little we value the animals trapped in this system.

Our future food supply depends on embracing sustainable farming. But sustainability encompasses more than just environmental impact.

It also has an ethical dimension, a duty of care to our farm animals, a duty of care to ourselves and others that cannot be met by animals that have been genetically engineered to prop up a brutal and inefficient factory farming system.

Reducing our meat consumption, ensuring high levels of welfare for those animals that are in the farming and food system and using grains that would otherwise be fed to animals to feed people are sensible and achievable aims.

Achieving them can make a substantial contribution to sustainability, health and higher animal welfare, while reducing global malnutrition and hunger for future generations.