**BBC**

**World's first flu-resistant GM chickens 'created'**

By Pallab Ghosh Science correspondent, BBC News

Words – 799, Title – 6, sentences – 35, Date – 13/01/2011

UK scientists have created the world's first genetically modified chickens that do not spread bird flu.

Writing in Science journal, the team says their work demonstrates it is possible to create a variety of GM farm animals resistant to viral diseases.

The research team inserted an artificial gene into chickens; this introduces a tiny part of the bird flu virus into chicken cells.

These birds become infected but render the virus harmless to other poultry.

The team believes that the genetic modification they have introduced is harmless to the chickens and to people who might eat the birds.

Professor Helen Sang of Edinburgh University told BBC News that genetic modification is potentially a much better way of protecting against diseases than vaccination because the GM technique works even if the virus mutates.

"It will protect a whole flock from avian influenza infection.

This is really exciting because bird flu is a real challenge to poultry production and if it were introduced to poultry breeding it would protect our large scale production flocks from avian inlfuenza," said Professor Sang.

Broad protection

The researchers say that, in principle, the technique could be used to protect any farm animal from any disease. The eventual aim is to develop animals that are completely resistant to viral diseases.

Genetic modification could be an alternative to vaccination, scientists say

According to co-author Dr Laurence Tiley, from the University of Cambridge, UK: "Agricultural selective breeding has made huge improvements on productivity of many livestock - but it's reaching the point where it's now limited.

"And the GM technologies allow you to introduce novel genes that don't exist in nature but are based on our detailed knowledge of the molecular biology of viruses.

We can specifically target these viruses to prevent them from replicating."

The researchers say they think the technology has the potential to boost food production and reduce costs.

"There's going to be a real problem in feeding the world as the population increases," says Professor Sang.

"As the demand for animal products increases and it's going to get increasingly expensive and we are looking at different ways to tackle that problem."

GM techniques could also have benefits for human health, according to Professor Sang.

If fewer animals are carrying viruses there is a lower chance of them mutating into a form that would be deadly to humans and so create a pandemic.

Cautious welcome

But the news received a cautious welcome from the poultry industry. Peter Bradnock of The British Poultry Council said more research was needed to assess the long term impact on farm animals before food producers would even consider using the technology.

Even then, companies would have to assess the likely reaction from consumers: "We have to have a big debate as to whether society wants to have GM animals even for this very good potential benefit," he told BBC News.

And Tim Elsdale, who is an organic farmer in East Sussex, said it was better to adopt good farming practices to avoid animals getting diseases in the first place than to create GM farm animals.

"We don't suffer much from animal diseases on this farm," he said.

"Organic methods of husbandry doesn't encourage disease if the animals are well spaced enough.

They live in a natural environment and they eat normal food then a lot of diseases that are prevalent on conventional farming would not be apparent to us".

If the food and farming industry did want to use GM technology in this way in the UK, they would need to seek prior approval from the Food Standards Agency (FSA).

The FSA would conduct a full detailed safety evaluation before any of this GM produce could enter the market.

In addition to that, produce would need to be labelled so that consumers would be able to make a choice about the food they eat.

If there were an application, the authorisation process could be carried out in a matter of months.

The FSA's Chief Scientist, Dr Andrew Wadge said it would be interesting to see if the debate over GM animals would go the same way as the debate over GM crops:

"I do think it's interesting that so far with GM technology it's not really a benefit for consumers and wouldn't it be interesting if we had produce that did offer a benefit?

"For example, food safety for us is about a bacteria found in chickens called *Campylobacter* which makes 500,000 people ill each year.

"If we could develop a GM chicken that is resistant to *Campylobacter* it would be very interesting indeed to see how consumers saw that technology and whether it was a technology they would be willing to embrace".

**DAILY MAIL**

**Scientists create GM 'superchicken' that doesn’t spread bird flu**

By [David Derbyshire](http://www.dailymail.co.uk/home/search.html?s=y&authornamef=David+Derbyshire)  
**UPDATED:** 09:00, 14 January 2011

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Title 9

A genetically modified 'superchicken' that doesn't spread deadly bird flu has been developed by scientists.

The bird is intended to prevent the outbreaks of avian influenza which lead to millions of birds being culled.

It could also stop new strains of flu mutating in domestic fowl and spreading to people, leading to killer worldwide pandemics.

The British team behind the GM chicken say it is 'inconceivable' that its meat or eggs could be harmful.

However, it will need rigorous safety checks before it could go into the food chain, they said.

But anti GM campaigners warned that genetic engineering was not the answer to stopping bird flu - and said the public would never accept GM eggs and meat.

Avian flu is a serious threat to farmers and people. Although it does not easily infect humans, when it does it can be deadly.

The latest, most virulent strain - called H5N1 - has killed more than 300 people since 2003 in 15 countries and led to the deaths of millions of birds.

In 2007 around 260,000 turkeys were culled in East Anglia after outbreaks of H5N1.

Doctors fear it could mutate in flocks of chickens into a new strain that is transmissible from person to person,  fuelling a pandemic that kills millions of people.

The GM chicken was created by a team at Cambridge University and Edinburgh University and reported today in the journal Science.

Dr Laurence Tiley, from Cambridge, said: 'Preventing virus transmission in chickens should reduce the economic impact of the disease and reduce the risk posed to people exposed to the infected birds.'

The chickens carry an extra gene that stops the flu virus replicating in their bodies.

The gene - which was added to embryo chicks while they were in the egg - produces 'decoy' loops of RNA,  the chemical cousin of DN, in cells throughout their bodies.

The decoy RNA interferes with the machinery that viruses use to make copies of themselves inside cells and spread throughout the body.

So although GM chickens fall  ill and die from flu - they cannot pass it onto other birds or people.

In tests at the Veterinary Laboratories Agency in Weybridge, Surrey, infecte GM chickens fell sick but did not transmit the flu virus to normal birds kept in the same pen.

 The gene is expected to work against all strains of bird flu, and the virus cannot easily evolve to escape its effects.

Because the new gene is dominant, chicks bred from a pair of GM birds will also be unable to transmit bird flu.

The trait will be passed down to future generations.

Dr Tiley said there was 'no observable difference' between the GM birds and their non-GM relatives he said.

'The nature of the decoy molecule means it is pretty well inconceivable that could have any detrimental effect on somebody that ate it because RNA is an unstable molecule that is easily broken down by the gut,' he said.

  'There is no reason to suggest that these chickens would be unsafe in any way.'

GM birds would need thorough safety tests and the approval of food agencies in America and Europe before they could enter the food chain.

Co-author Prof Helen Sang, from the Roslin Institute, Edinburgh, said: 'Countries like China are interested in possibly of using GM to protect their poultry stocks and it will inevitably be more expensive because you will have to use products of breeding companies to stock your producers,' she said.

However, costs would come down over time, she added.

The researchers are now working on chickens that are completely immune to bird flu.

They believe the technique could be used to protect against the spread of disease in other animals such as turkeys, geese and pigs.

But Pete Riley from GM Freeze said: 'These are global industries with thousands of broiler and battery units around the world and it improbable that the GM chickens will be bred fast enough to keep pace with the mutations that are occurring in avian flu virus all the time around in the northern and southern hemisphere.

'In intensive units the environment is quite different to the lab and so far this has not been part of the research.

In addition, many poorer producers may find the additional cost of the GM birds too high and stick with conventionally bred birds.

'Genetic diversity in chickens, not genetic modification of a single breed, is important in reducing the spread of infections, as it is with all farm animals'.

**GUARDIAN**

**GM chickens created that could prevent the spread of bird flu**

[Alok Jha](http://www.guardian.co.uk/profile/alokjha), science correspondent

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Date – 13/01/2011

Researchers produce genetically modified (GM) chickens that may cut the risk of new bird flu strains transferring to humans

Scientists have produced genetically modified chickens that appear to prevent the spread of avian influenza.

Though the chickens can themselves become infected with [flu](http://www.guardian.co.uk/society/flu) viruses such as H5N1, say the researchers, they cannot pass on the virus to any other birds with which they come into contact.

The technique, if adopted commercially, could provide a new strategy to slow or prevent outbreaks of [bird flu](http://www.guardian.co.uk/society/2007/feb/05/theissuesexplained.health) within poultry flocks, which would protect the health of chickens and also reduce the chances of viruses transferring to humans.

Many flu viruses that infect humans, including the H1N1 strain behind the [swine flu](http://www.guardian.co.uk/world/swine-flu) pandemic that swept across the world in 2009 and caused 6,000 deaths, start in domestic birds before transferring to mammals such as horses and pigs, and then ending up in humans.

"Chickens … can enable new strains of flu to be transmitted to humans," said [Laurence Tiley](http://www.vet.cam.ac.uk/research/investigators/tiley.html), a molecular virologist at the University of Cambridge's department of veterinary medicine, who led the work.

"Preventing virus transmission in chickens should reduce the economic impact of the disease and reduce the risk posed to people exposed to the infected birds."

The work is a proof-of-principle project and it would take several years of safety tests before any transgenic chickens would be allowed to enter the food chain.

Though there are no transgenic animals currently approved for human consumption, they might not be far away.

Last year, the US Food and Drug Administration [proposed allowing the sale of the AquAdvantage salmon](http://www.guardian.co.uk/environment/2010/aug/25/gm-salmon-us-fda-consultation) – a modified North Atlantic salmon created by [AquaBounty Technologies in Boston](http://www.aquabounty.com/), Massachusetts.

The company says the salmon grows at twice the speed of similar fish.

In the new research on chickens – [described in the latest edition of Science](http://www.sciencemag.org/content/331/6014/223.short) – Tiley's team introduced a gene into chicken embryos that produces a small "decoy" molecule in the birds' cells.

The decoy molecule mimics part of the molecular control mechanism of the [bird flu](http://www.guardian.co.uk/world/bird-flu) virus, in this case H5N1.

The virus incorporates the decoy instead of its own genetic material and becomes unable to replicate properly in the transgenic chicken's cells.

In their experiment, the scientists infected 10 genetically modified birds and 10 related, but non-[GM](http://www.guardian.co.uk/environment/gm) birds with the avian H5N1 virus.

Each infected group was then split into two sub-groups of five, and each sub-group was exposed to a new group of either 12 GM or 12 non-GM birds.

The next step was to keep all groups for about 12 days and record the health status of all the birds.

All the non-GM birds died within five days of infection and the birds that came into contact with them also died a few days later, exactly as expected.

The GM birds infected with H5N1 also died after a few days but, crucially, none of the birds they came into contact with – transgenic or not – became infected.

"Our genetic modification doesn't stop the birds getting flu if you infect them directly, but once they've got it, they don't transmit it," said [Helen Sang of the Roslin Institute at the University of Edinburgh](http://www.roslin.ed.ac.uk/research/people.php/Helen.Sang), who also worked on the project.

How the decoy prevents the spread of the virus is still uncertain. Tiley believes the virus that is produced and shed by the cells of the transgenic birds has a defect that prevents it from efficiently infecting other birds.

The genetic decoy would work against all strains of avian influenza, said Tiley, and the virus would be unlikely to evolve a way to escape its effects.

"This is quite different from conventional flu vaccines, which need to be updated in the face of virus evolution as they tend only to protect against closely matching strains of virus and do not always prevent spread within a flock."

Whether or not transgenic chickens should be used commercially was a question for regulators, companies and consumers, the scientists said.

"The genetic modification we describe is a significant first step along the path to developing chickens that are completely resistant to avian flu," said Tiley.

"These particular birds are only intended for research purposes, not for consumption."

Even if they were approved for use, the technology would not be required everywhere.

"The expectation is that you would introduce it in countries where there is endemic avian influenza," said Sang.

"At the moment, in Europe it's not endemic so you wouldn't expect to use it here."

She added: "If you're thinking longer-term application of the technology, we want to facilitate public debate about using genetic modification for this purpose in commercial production birds."

**INDEPENDENT**

**GM lab creates chicken that cannot spread bird flu**

**Words – 417**

**Title 9**

[Steve Connor](http://www.independent.co.uk/biography/steve-connor)

Friday 14 January 2011

Scientists have developed a way of curbing the spread of avian flu with the help of genetically modified chickens that do not spread the virus.

The chickens have an extra piece of DNA inserted into their genomes which produces a "decoy" molecule that blocks the replication of the influenza virus and prevents transmission to the rest of the flock.

Researchers believe the breakthrough could eventually lead to the creation of GM poultry, pigs and other livestock that are fully resistant to a range of infectious diseases.

They also said that the development could help to lower the risk of transmitting dangerous animal viruses to humans.

While consumers in Britain have been resistant to plant-based products containing GM ingredients, the scientists behind the GM chicken believe that the proposal to develop disease-resistant varieties might become acceptable due to concerns about animal welfare and the transmission of infections to humans.

Laurence Tiley of Cambridge University, who was a key member of the research team, said: "We believe the attitude of the UK public to GM food depends on the nature and purpose of the genetic modification.

"Disease resistance is clearly a beneficial characteristic for animal welfare and public health."

The GM chicken was created by adding a synthetic fragment of DNA to their chromosomes, which causes the chickens to manufacture small lengths of RNA, the genetic molecule used by influenza viruses.

These particular pieces of RNA act as decoys by locking on to the enzyme used by flu viruses to make copies of themselves.

"The decoy mimics an essential part of the flu virus genome that is identical for all strains of influenza A.

"We expect the decoy to work against all strains of avian flu and that the virus will find it difficult to evolve to escape the effects of the decoy.

If you've got genetically modified chickens that are resistant to the avian flu virus then you don't in theory have to bother with vaccination anymore," he added.

When scientists carried out tests on the GM chickens they found that although the birds were still vulnerable to being infected with avian flu and that they became sick with flu, but they did not appear to transmit the virus to other members of their flock, even if these birds were normal, non-GM varieties.

Helen Sang of the Roslin Institute at Edinburgh University, another leading member of the team that carried out the study, published in the journal Science, said that the results achieved so far are "very encouraging".

**REUTERS**

**Scientists make chickens that don't spread bird flu**

By [Kate Kelland](http://blogs.reuters.com/search/journalist.php?edition=us&n=kate.kelland&), Health and Science Correspondent

LONDON | Thu Jan 13, 2011 2:46pm EST

LONDON (Reuters) - British scientists have developed genetically modified (GM) chickens that cannot transmit bird flu infections -- a step that in future could reduce the risk of avian flu spreading and causing deadly epidemics in humans.

Scientists from Cambridge and Edinburgh universities said that while the transgenic chickens still got sick and died when they were exposed to H5N1 bird flu, they didn't transmit the virus to other chickens they came into contact with.

"Preventing virus transmission in chickens should reduce the economic impact of the disease and reduce the risk posed to people," said Laurence Tiley, of Cambridge's department of veterinary medicine, one of the lead researchers on the study.

H5N1 bird flu has been circulating in Asia and the Middle East, with occasional outbreaks in Europe, since 2003 and has killed or forced the destruction of hundreds of millions of birds, according to the world animal health organization OIE.

It rarely infects people but when it does it is deadly: the World Health Organization has documented 516 cases in people since 2003 and the virus has killed 306 of them.

Experts say the danger is that the virus will evolve into a form that people can easily catch and pass to one another, causing the transmission rate to soar and producing a pandemic in which millions of people could die.

ECONOMIC AND FOOD SECURITY THREAT

In Southeast Asia, [China](http://www.reuters.com/places/china) and parts of Africa, bird flu is already a major economic and food security issue, and also poses a constant threat of being transmitted to humans.

[South Korea](http://www.reuters.com/places/south-korea), already battling an outbreak of foot-and-mouth disease, said this week it was raising its bird flu alert level after detecting H5N1 bird flu at poultry farms.

Helen Sang from the Roslin Institute at Edinburgh University, who worked with Tiley, told a joint briefing the GM chickens could offer a way to improve economic and food security in parts of the world where bird flu is a major threat, but said using them would probably add slightly to farming costs.

"Countries like China are interested in the possibility of genetic modification to protect their poultry stocks and people," she said. "It will inevitably be more expensive because you'd have to use the products of breeding companies to stock the producers." At the same time, the need for vaccination and losses from whole flocks being infected should be reduced.

While large poultry producers could benefit from this early type of transgenic bird, smaller "backyard" farmers would need to wait until scientists create birds that can be bred on small farms. "That would be a means of ensuring that the birds these small farmers bred themselves still carried the protective transgene," Tiley said.

To breed their GM chickens, the researchers introduced a new gene into them that manufactures a small "decoy" molecule that mimics an important control element of the bird flu virus.

The replication machinery of the virus is tricked into recognizing the decoy molecule instead of the viral genes and this interferes with the virus' replication cycle.

After producing the modified chickens, they infected 10 of them and 10 normal chickens with H5N1 bird flu. Like the normal chickens, the transgenic birds became sick with the virus, but they did not transmit the infection on to other chickens kept in the same pen with them -- even if those chickens were normal, non-transgenic birds. The study was published in Science.

The researchers said they now plan to work on trying to make chickens that are fully resistant to bird flu rather than just blocking bird-to-bird transmission.

**TELEGRAPH**

**Chickens genetically modified to stop bird flu**

Title – 7

Body – 168

Sentences - 7

9:05AM GMT 14 Jan 2011

Chickens have been genetically modified to prevent them spreading potentially deadly bird flu.

The British research may lead to ways of halting bird flu outbreaks within poultry stocks.

As well as protecting the health of poultry, it could reduce the risk of a killer pandemic among humans.

Bird, or avian, flu does not easily infect humans but when it does the effects can be serious - one strain, H5N1, has caused around 300 deaths since the mid-1990s and kills almost 80% of all those it infects.

Experts fear a mutated version of the virus that transmits easily from person to person could claim millions of victims around the world.

Dr Laurence Tiley, from Cambridge University, one of the scientists who carried out the new research, said: "Chickens are potential bridging hosts that can enable new strains of flu to be transmitted to humans.

Preventing virus transmission in chickens should reduce the economic impact of the disease and reduce the risk posed to people exposed to the infected birds.