

The Roslin Institute at the University of Edinburgh is a new world class research centre

The Roslin Institute undertakes top-class basic and translational science to tackle some of the most pressing issues in animal health and welfare, their implications for human health and for the role of animals in the food chain.

The Centre was formally established during 2008, and in 2011 moved to a new £60.6M building on the University of Edinburgh's veterinary campus at Easter Bush.

The Roslin Institute provides holistic solutions to global challenges in human and veterinary medicine and the livestock industry.

<http://www.roslin.ed.ac.uk/public-interest/gm-chickens/>

GM Chickens That Don't Transmit Bird Flu

Breakthrough could prevent future bird flu epidemics

Chickens genetically modified to prevent them spreading bird flu have been produced by researchers at the universities of [Cambridge](#) and [Edinburgh](#).

The scientists have successfully developed genetically modified (transgenic) chickens that do not transmit avian influenza virus to other chickens with which they are in contact. This genetic modification has the potential to stop bird flu outbreaks spreading within poultry flocks. This would not only protect the health of domestic poultry but could also reduce the risk of bird flu epidemics leading to new flu virus epidemics in the human population. [Read more »](#)

GM Chickens: Question & Answers

What is genetic modification (GM)?

Genetic modification (GM), genetic manipulation (GM) and genetic engineering (GE) all refer to the same thing – the use of modern biotechnology techniques to change the genes of an organism, such as a plant or animal. A genetically modified organism is a plant, animal or other organism that has been changed using genetic modification.

GM breeding is used because it can change the genes of an organism in ways not possible through traditional techniques providing opportunities for new plant varieties and animal breeds.

Are the Roslin/Cambridge GM chickens resistant to bird flu?

No. They can be infected with bird flu (avian influenza) and succumb to clinical disease but they do not transmit the infection to other birds. This is important because it would help to stop flu outbreaks spreading within and between poultry flocks.

What is the genetic modification in the chickens that stop them transmitting bird flu?

It is a small molecule that is specifically designed to stop the flu virus reproducing after it has infected a chicken. This RNA molecule mimics the region of the flu virus genome that controls virus replication. It is referred to as a "decoy" because production of these mini RNA molecules binds and diverts the flu virus enzyme (the polymerase) from its crucial functions that are required for virus replication.

Are the birds affected in anyway?

There is no observable difference in the development, health or growth between the GM birds and their non-GM brothers and sisters. They are, however, prevented from transmitting influenza infection on to other chickens.

Is this genetic modification going to be used in the chickens we eat?

Ultimately the adoption of such animals for consumption in the UK is an issue that the relevant authorities would need to consider in consultation with the public. We stress that these particular chickens are for research purposes only and are not intended for consumption. They have enabled us to confirm that the transgene is effective and so it is likely to be useful in future development of influenza resistant chickens.

Can genetic modification be used to control other chicken diseases?

Using genetic modification (also known as transgenic) technologies to introduce disease resistance into poultry has the potential to control a wide range of diseases. Here we have identified one effective strategy (a molecular decoy) and demonstrated its potential against influenza virus. We anticipate that this transgene would be part of a more comprehensive package targeting influenza and other pathogens to produce transgenic chickens that are resistance to a number of diseases.

Is bird flu really something to worry about?

Currently, bird flu is not the most significant problem in UK chicken flocks. However, if H5N1 were to establish itself in the wild bird population in Europe, then it could pose a significant problem, particularly for free-range birds.

In S.E Asia, China and parts of Africa, bird flu is a significant problem from both an economic and food security perspective and also because of the possibility of being transmitted to humans. In this context, introducing these transgenic birds widely into the domesticated poultry population could reduce the economic and public health impact of bird flu.

Would these chickens be safe to eat?

Yes. There is no reason to suggest that these chickens would be unsafe in any way. The nature of the genetic modification is such that it is extremely unlikely that it could have any negative effects on people

consuming the chickens or their eggs. Nevertheless, any use of chickens with this genetic modification would have to be fully assessed by the appropriate authorities e.g. Food and Drug Administration in the US, European Food Safety Authority in Europe.

Do you think the British public will be prepared to eat genetically-modified chickens?

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 public's awareness of the global threat of influenza virus is high. We hope that examples that demonstrate clear consumer benefits with no inherent risk will encourage constructive debate about the potential of GM food in the future. Ultimately the British public will need to see how they benefit from eating genetically modified food, before they are likely to make the decision to do so.

What are your next steps?

On the research front, we are aiming to make birds fully resistant to avian influenza infection rather than just blocking bird-to-bird transmission that we have managed so far. We are developing new approaches to use combinations of different inhibitors to produce robustly resistant birds. We will continue to investigate how the decoys work and how they can be improved. We are also interested in studying whether the virus is able to mutate and escape the inhibitory effect of the decoy.

What precautions have been taken to prevent the DNA from the GM chickens getting into the food chain (before appropriate approval has been granted)?

There is no possibility of DNA from these GM chickens getting into the food chain, unless by some illegal or malicious intent. The chickens carry a marker that would be very easily detected if such an event occurred.

Can other animal species be genetically modified to improve disease resistance?

It is possible to genetically modify several farm animal species, including chickens, pigs, sheep and cows. The technologies are currently being developed that will enable different genetic modifications to be made depending on the genetic change required. It is important to develop public debate and policies to ensure appropriate regulation and use of such technological advances as they are developed.



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