

# A step towards new vaccines for most important chicken parasite

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Researchers funded by the Biotechnology and Biological Sciences Research Council (BBSRC), among others, have taken the first step in developing a new type of vaccine to protect chickens against coccidiosis, the most important parasite of poultry globally.

A vaccine of this type -- based on proteins from the coccidiosis bug rather than being derived from a live parasite -- could be produced on a larger scale than is currently possible so could be used to provide much more widespread protection to chicken flocks.

Protecting against animal diseases is going to play an important role in ensuring global food security.

The researchers have produced a much more detailed picture of how coccidiosis attacks chickens, uncovering the [protein molecules](#) which are secreted onto the surface of the coccidiosis-causing-parasite, *Eimeria*, that allow it to attach-to and invade cells in a chicken's gut. The scientists also found that when purified and used to inoculate chickens, one of these molecules provided the birds with some protection against coccidiosis and so shows promise as the basis of a new vaccine.

The research was carried out by an international team with funding from BBSRC, the Engineering and Physical Sciences Research Council (EPSRC), the Medical Research Council (MRC) and the Wellcome Trust. The research is published today (13 October) in the journal [PLoS Pathogens](#) and the UK-based research took place at Imperial College

London, the Institute for Animal Health, the University of Oxford and the Royal Veterinary College.

Professor Fiona Tomley of the Royal Veterinary College said "Coccidiosis is the most important parasite of poultry globally. Conservative estimates by the EU put the annual worldwide cost of coccidiosis at over £1 billion so controlling it is very important economically but it is also valuable for improving the health and welfare of chickens."

Currently, coccidiosis is treated with antimicrobial drugs or using a vaccine derived from a live parasite. Both of these methods are problematic as drug resistance is widespread and the vaccine is relatively expensive to produce so cannot be used on a wide, preventative scale. Vaccines for some other diseases are based on single proteins rather than killed versions of the disease-causing bug. These so-called 'recombinant vaccines' offer a number of advantages over killed-disease vaccines as they are safer and can be produced more cheaply and quickly and on an industrial scale.

The protein revealed in this study could form the basis of a recombinant vaccine. It is called MIC3 and is important in the early stages of a coccidiosis infection. MIC3 is secreted by the Eimeria parasite and binds to sugar molecules on the surface of cells in the caecum, a section of the large intestine. Another scientist involved in this project, Professor Ten Feizi, and her team at Imperial College London, used a new and powerful technology known as carbohydrate microarray to study the particular sugar molecules which the parasite's MIC3 protein seeks out and binds.

Professor Stephen Matthews of Imperial College London said "Finding a target protein that could form the basis of a new type of vaccine for coccidiosis has been the holy grail for researchers combating coccidiosis

for some time. The high resolution detail afforded by NMR spectroscopy on recombinant vaccines provides important clues for their optimal design, and paves the way for cost-effective and widespread protection against this important poultry disease."

Professor Douglas Kell, BBSRC Chief Executive, said "Finding new ways to combat diseases of farmed animals is going to be important to ensure global food security -- but also to the UK economy. We have a valuable poultry breeding and production industry in this country so any steps towards a new vaccine for coccidiosis are a triumph. This work is a nice example of how studying the fundamental biology of a process at the most minute level could lead to new weapons in the fight against disease. It also underscores the increasing importance of biologics to the UK Bioeconomy".

Provided by Biotechnology and Biological Sciences Research Council

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