



Media Release

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Re-writing 'the book' on a devastating poultry disease

A world-first discovery made by a Monash University PhD student working at CSIRO's Australian Animal Health Laboratory (AAHL) in Geelong, has poultry scientists worldwide taking a fresh look at the devastating bacterial disease, necrotic enteritis.

In a paper published on 8 February in the respected 'open access' international journal *PLoS Pathogens*, Anthony Keyburn and a team of Australian scientists outline the discovery of a new toxin and the finding that alpha-toxin protein – long thought to be required for necrotic enteritis to develop – is not the main cause of the chicken disease.

Mr Keyburn – who has been working at AAHL on an Australian Poultry Cooperative Research Centre (CRC) project – said necrotic enteritis is one of the world's most common and financially crippling poultry diseases.

"It's caused by *Clostridium perfringens*, a bacterium found in soil, litter, dust and in small quantities in the intestines of healthy chickens. The bacterium only causes disease when it proliferates to high numbers, producing extracellular toxins that attack the bird's intestines, causing lesions," he said.

Poultry producers use antibiotics to treat and prevent the disease, which, when triggered, can cause mortality rates of up to 50 per cent. Necrotic enteritis costs the world's poultry industries an estimated US\$2 billion every year.

The disease was first described in 1961 and alpha-toxin was implicated as the major causative factor, although definitive proof has never been reported. As a result, for the last 30 years all vaccine development work has been based on the assumption that alpha-toxin was the key.

Mr Keyburn said the research team at AAHL began to question the involvement of alpha-toxin when a survey showed that local disease-causing bacterial strains produced low levels of this toxin.

"We tested the importance of alpha-toxin by genetically altering the bacterium so it no longer produced any of the protein," he said. "Despite the toxin's absence, our bacterial isolates still caused disease in chickens. This demonstrates that the development of necrotic enteritis in chickens is not dependent on *C. perfringens* producing a functional alpha-toxin."

This finding led the team to expand their search for the real cause of necrotic enteritis, finding a novel toxin – NetB – that is involved in the disease-causing potential of a high proportion of virulent *C. perfringens* strains.

These discoveries have led to a new research project being established within the Australian Poultry CRC led by CSIRO's Dr Rob Moore and Monash University's Professor Julian Rood – a Chief Investigator with the Australian Research Council Centre of Excellence in Structural and Functional Microbial Genomics.

Dr Moore said the project is investigating NetB and other proteins produced by *C. perfringens*, with the aim of developing effective vaccines against the disease.

"Around the world, poultry producers are waiting for vaccines against necrotic enteritis," he said. "Thanks to Anthony's discoveries, scientists should now be able to develop the vaccines within a couple of years."

Image available at: <http://www.scienceimage.csiro.au/mediarelease/mr08-12.html>

Paper at: <http://pathogens.plosjournals.org/perlserv/?request=get-document&doi=10.1371/journal.ppat.0040026>

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