

Vaccinating cattle against *E. coli* O157 could cut human cases of infection by 85 percent, study shows

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Vaccinating cattle against the *E. coli* O157 bacterium could cut the number of human cases of the disease by 85%, according to scientists. The bacteria, which cause severe gastrointestinal illness and even death in humans, are spread by consuming contaminated food and water, or by contact with livestock faeces in the environment. Cattle are the main reservoir for the bacterium.

The vaccines that are available for cattle are rarely used, but could be significant.

The research was led by a team of researchers at the University of Glasgow in collaboration with the University of Edinburgh, the Royal Veterinary College, Scotland's Rural College, Health Protection Scotland, and the Scottish *E. coli* O157/VTEC Reference Laboratory.

The study, published in the online journal *PNAS*, used veterinary, human and molecular data to examine the risks of *E. coli* O157 transmission from cattle to humans, and to estimate the impact of vaccinating cattle.

The risk of *E. coli* O157 infection is particularly significant when the cattle are 'super-shedding' – excreting extremely high numbers of bacteria in their [faeces](#) for a limited period of time. Vaccines against the bacteria exist that can reduce super-shedding.

As a consequence, the researchers predict that vaccinating cattle could reduce human cases by nearly 85 percent, far higher than the 50 percent predicted by studies simply looking at the efficacy of current vaccines in cattle.

These figures provide strong support for the adoption of vaccines by the [livestock industry](#), and work is now underway to establish the [economic basis](#) for such a programme of vaccination. In addition, research is continuing in Scotland by the same collaborative grouping to develop even more effective vaccines that would further reduce the impact on human disease.

Lead author, Dr Louise Matthews, Senior Research Fellow in the Institute of Biodiversity, Animal Health and Comparative Medicine, said: "*E. coli* O157 is a serious [gastrointestinal illness](#). The economic impact is also serious – for instance studies in the US suggest that healthcare, lost productivity and food product recalls due to *E. coli* O157 can cost hundreds of millions of dollars each year.

"Treating cattle in order to reduce the number of human cases certainly makes sense from a human health perspective and, while more work is needed to calculate the cost of a vaccination programme, the public health justification must be taken seriously."

In Scotland, an average of 235 culture positive cases of *E. coli* O157 infection per year (i.e. people who had the organism in their stools) were notified to Health Protection Scotland from 2008 to 2012.

The vaccines that are available currently have poor take-up: one version in the US is not fully licensed because medicines for veterinary use must show that animal health is improved. This is problematic because *E. coli* O157 does not harm cattle and assessing the impact of treatment involves coordination between human and veterinary health

practitioners.

Senior author Professor Stuart Reid of the Royal Veterinary College added: "We increasingly recognise the fact that we share a common environment with the animals we keep – and inevitably the pathogens they harbour. This study is an excellent example the interface between veterinary and human medicine and of the concept of 'One Health' in action – controlling infections in animals can have a major impact on public health."

More information: Predicting the public health benefit of vaccinating cattle against Escherichia coli O157, *PNAS*,
www.pnas.org/cgi/doi/10.1073/pnas.1304978110

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