



## Reduction of the incidence of Campylobacter infection in humans

### BRIEF

#### AN INTRODUCTION TO SBRI

SBRI is a mechanism which enables public sector bodies to connect with innovative ideas and technology businesses to provide innovative solutions to specific Public Sector challenges and needs.

The Public sector is able to find innovative solutions by reaching out to companies from different sectors including small and emerging businesses. New technical solutions are created through accelerated technology development, whilst risk is reduced through a phased development programme. SBRI also provides business with a transparent competitive and a reliable source of early-stage funding.

SBRI competitions are open to all companies. In this particular instance, the funders are also inviting applications from academic researchers who can meet the requirements of the call. Applicants from outside the UK will also be considered.

The SBRI scheme is particularly suited to small and medium-sized business, as the contracts are of, relatively, small value and operate on short timescales. Developments are 100% funded and focused on specific identified needs, increasing the chance of exploitation. Suppliers for each project will be selected by an open competition process and will be encouraged to protect the intellectual property generated from the project, with certain rights of use retained by the contracting Department. This is an excellent opportunity to fund development of a new technology for a range of potential new customers.

#### The Food Standards Agency

The Food Standards Agency is an independent Government department set up by an Act of Parliament in 2000 to protect the public's health and consumer interests in relation to food. Information on the Agency's strategy can be found at:

<http://www.food.gov.uk/aboutus/publications/busreps/strategicplan/>

## The Department for Environment, Food and Rural Affairs

As the Government Department with responsibility for farming, Defra aims to reduce zoonotic organisms at primary production in order to protect public health.

### Background and Challenge

Early in 2010, UK Government published its food policy strategy, (Food 2030<sup>1</sup>), to address the key challenge of a more sustainable food chain by 2030. The vision for a sustainable and secure food system by 2030 includes food that is produced, processed and distributed to feed a growing global population - in ways that protect food safety and promote high standards of animal health and welfare - and to ensure the public feel confident that food is safe

The vision (Food 2030) identifies the importance of research and innovation in underpinning delivery of the Government's policy objectives and that coordinated Government approach is required to deliver this, including close working with devolved administrations. To achieve this a UK Cross-Government Food Research and Innovation Strategy<sup>2</sup> was developed, led by the Government Chief Scientist John Beddington, to provide an overarching government framework for food research and innovation across the UK. This strategy highlights the need for funders to coordinate efforts to address the key challenges in the food system, among them food safety and in particular *Campylobacter* as one of the key research targets.

The following priority for *Campylobacter* research has been identified as one of the key enablers to delivery of future reduction of *Campylobacter* levels in the UK food chain. This priority is part of a wider set of priorities, identified by academics, industry and policymakers, at a joint funders' strategy workshop (co-hosted by BBSRC, FSA and Defra) in October 2009. A research strategy arising from the workshop will be published in the near future. Delegates at the workshop were asked to consider where an intervention to reduce *Campylobacter* in the food chain (farm to fork) might be feasible, what the barriers to implementation might be, and what scientific questions remained unanswered. The identified scientific questions/gaps were merged and distilled to a single list. Delegates were then asked to rate the relative importance of these questions/gaps in order to prioritise the list. The priorities in this strategy are the highest ranked priorities from the list, i.e. those identified as the main focus of attention for funders.

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<sup>1</sup> <http://www.defra.gov.uk/foodfarm/food/pdf/food2030strategy.pdf>

<sup>2</sup> <http://www.dius.gov.uk/~media/publications/GO-Science/UK-Cross-Government-Food-Research-Strategy>  
SBRI\_FSA\_45\_002 Brief *Campylobacter*

**The key overarching outcome is:**

**Reduction of the incidence of *Campylobacter* infection in humans**

through reductions in:

- *the level of the bacterium in animal hosts*
- *the potential for cross-contamination throughout the food chain*

**Scope**

The aim of this SBRI competition is ultimately Reduction of the incidence of *Campylobacter* infection in humans by:

- providing farmers with tools to monitor the *Campylobacter* status of their flocks and so inform on best practice to keep flocks *Campylobacter* free

**Topic : Feasibility of developing a Rapid, on-site test for *Campylobacter***

**There is a requirement for a rapid, accurate, cheap test that can be deployed on farms to identify *Campylobacter* infection. This test would be used to inform actions on the farm and would need to be simple and robust enough for farm workers to use.** *Campylobacter* is the most common cause of food poisoning in the UK, responsible for an estimated 321,000 cases in England and Wales alone in 2008<sup>3</sup> and resulting in 15,729 hospitalisations, 80 deaths and an estimated cost to the economy of over £590M<sup>4</sup>. It is found mainly in poultry but also in red meat, unpasteurised milk and untreated water. Although it does not normally grow in food, it spreads easily and has a low infective dose, so only a few bacteria in a piece of undercooked chicken or transferred from raw chicken onto other ready to eat foods can cause illness.

A survey<sup>5</sup> carried out by the Food Standards Agency (FSA) of *Campylobacter* in chicken on retail sale in the UK between May 2007 and September 2008, reported that *Campylobacter* was present in 65% of the fresh chicken samples tested. An EU baseline survey carried out in 2008 and published by EFSA<sup>6</sup> in March 2010 showed the UK estimated prevalence for *Campylobacter* in broiler batches (caecal contents) was 75.3% and in broiler carcasses (skin samples) 86.3%. These results were above the weighted EU mean prevalence's of 71.2% and 77.0% respectively. There

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<sup>3</sup> The number of reported laboratory confirmed cases of foodborne illness, 55,000 in 2007, is known to be significantly lower than the real number that occurs due to under-reporting of cases. To take account of this under-reporting, and provide a measure of the severity of disease caused, the HPA calculate annual estimates of the actual number of cases of food poisoning that occur in the community in England and Wales. This calculation is based on the number of laboratory-confirmed reported cases, adjusted to take account of the under-reporting of cases which is recognised to occur. Adjustment for under-reporting relies on data from outbreaks and special studies such as the Study of Infectious Intestinal Disease in England (IID study). Currently estimates can only reliably be calculated for England and Wales due to differences in reporting systems between UK countries and because the IID study was only carried out in England

<sup>4</sup> <http://www.food.gov.uk/multimedia/pdfs/foodchainhazardsimpacts>

<sup>5</sup> <http://www.food.gov.uk/news/newsarchive/2009/oct/chicksurvey>

<sup>6</sup> <http://www.efsa.europa.eu/en/scdocs/scdoc/1503.htm>

was a wide range of *Campylobacter* prevalence across Members States varying from 4.9% to 100.0% in broiler carcasses and from 2.0% to 100.0% in broiler batches.

The findings from these surveys show that there are *Campylobacter* related challenges in our food-safety system. One of the main priorities of the FSA is to reduce food-borne diseases in the UK. This is reflected in the FSA's Science and Evidence Strategy 2010-15<sup>7</sup> and Strategic Plan 2010-2015<sup>8</sup> which states that food-borne disease will be reduced using a targeted approach, tackling *Campylobacter* in chicken as a priority. In order to achieve a substantial reduction in *Campylobacter*, FSA is implementing a *Campylobacter* Risk Management Programme. The Programme encompasses a range of projects targeted at different points across the food chain, from farm to fork. To measure progress on the effectiveness of the Programme a new target for the reduction in levels of *Campylobacter* in raw chicken at retail will be set and published by December 2010, to be achieved by April 2015. The target will be set and achieved through stakeholder engagement and partnership working.

Research undertaken during the previous two decades has shown that *Campylobacter* is a complex organism and it is expected to take a further number of years to more fully understand the risk factors associated with the organism and to develop and implement a comprehensive risk management strategy to reduce contamination of the UK food-chain and ultimately human foodborne infections. In the short-term, there are a number of current biosecurity measures and interventions that are or could be in place in the UK that need to be evaluated for their cost effectiveness in reducing *Campylobacter* levels. Complementary data and lessons learnt from EU and International projects also need to be collated and considered. In the longer-term, it is likely that new interventions will emerge as more underpinning research on risk factors is undertaken.

## **Research Requirements**

### **Feasibility of developing a rapid on-site test for *Campylobacter***

On farm control of *Campylobacter* is promoted to be achievable by strict biosecurity. Farmers who have implemented what is perceived as best practice are keen to understand if their efforts and hard work have resulted in producing a *Campylobacter* free flock, and if not, to understand when *Campylobacter* was introduced into the flock and attempt to correlate this with aspects of their biosecurity protocol that have either not been consistently applied or are not effective .

In addition there are specific interventions that are both currently available or in development that are reported to contribute to the production of poultry that have not been colonised with *Campylobacter* such as water treatment, fly screens, hygiene barriers, bacteriophage, bacteriocins and vaccines.

The ability to rapidly assess the impact of any such intervention is desirable. Due to the time required for transport, sample processing, testing and reporting, there is currently an inevitable

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<sup>7</sup> <http://www.food.gov.uk/multimedia/pdfs/publication/sciencestrategy0210.pdf>

<sup>8</sup> <http://www.food.gov.uk/multimedia/pdfs/strategy20102015.pdf>

delay from samples being taken, for example from the environment, poultry house, people or flock, and results being available to the farmer.

Maintaining motivation in farmers is seen as key to achieving consistent application of an effective biosecurity protocol that includes the use of interventions that are effective in their situation. A rapid, robust test for *Campylobacter* that enables results to be available in real time would provide a toll to farmers to monitor and identify best practice.. In addition, real time results that are visible, for example by a colour change in comparison to a laboratory report, is also perceived to be a more understandable way of communicating information. An immunological based dip-stick test similar to a pregnancy test would be practical but it is not known if there are any conserved antigens unique to the pathogenic strains of interest. Alternatively a DNA probe-based assay could be possible targeting key sequences, however it is not known if this would be a possible cost effective approach. These are just examples of possible approaches. There have been recent developments in the area of rapid tests and an investigation is required to see how feasible, in terms of time and cost, the application of current technology is to the development of a *Campylobacter* test fit for the purpose described. Given the high risk in rapid test development feasibility data is essential before any approach could be substantially supported and the involvement of industry to ensure any approach is fit for purpose is essential.

**Proposals** are therefore invited to:

**Undertake a study to provide information on the feasibility of development in terms of cost, speed and ease of use for a rapid on site test for *Campylobacter* in poultry production**

All methods of detection are of interest. The ultimate technical criteria for selection will be based on:

- Sensitivity
- Specificity
- Speed
- Ease of use
- Robustness
- Value for Money

The ideal kit would be:

- Inexpensive
- Give immediate results, providing feed back to the testers as they work or providing information to inform decisions.
- Must be very simple so as to be readily used on farm

Applicants will be expected to demonstrate a good understanding of the industrial setting for application of the proposed test, its drivers and constraints, by clear links to the relevant industry. They will also be expected to demonstrate a good understanding of the complexity of *Campylobacter* as an organism and the factors which may impact on the development of a suitable test, probably by clear links to expertise in the science base.

## **APPLICATION PROCESS**

Directions on how to enter this competition can be found in the Invitation to Tender (SBRI\_FSA\_45\_001 Invitation to Tender).

More information on this and other competitions may be obtained at [www.innovateuk.org/SBRI](http://www.innovateuk.org/SBRI)