A multidisciplinary approach to the control of *Campylobacter* in broiler flocks

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Introduction



- Campylobacter spp. are the most common bacterial cause of human infectious intestinal disease.
- Poultry meat is regarded as one of the main sources of infection.
- Current strategies for the prevention and control of human campylobacteriosis include the reduction of *Campylobacter* from poultry flocks.
- Campylobacters are ubiquitous in the farm environment.
- Evidence suggests that poultry flocks are infected horizontally from environmental sources.
- Increasing interest in the development of national *Campylobacter* control programmes prompted a VLA and Bristol University project.

- A 4 year study, funded by Defra, began in July 2002.
- A multidisciplinary approach, including **farmer surveys**, **epidemiological field studies** and the development of novel **molecular tools**, has been adopted.

Aims

(1) Provide a better understanding of the major sources of *Campylobacter* infection in broiler flocks

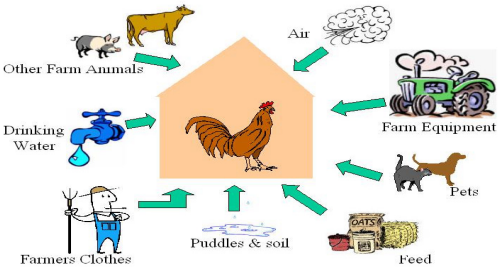

Figure 1: Recognised potential environmental sources of broiler flock infection

(2) Develop and evaluate, with industry, a practical control package to reduce the introduction and spread of *Campylobacter* in different types of broiler flocks

Study Design

Molecular Tools

- As part of the approach to develop practical control measures for broiler flocks against *Campylobacter*, it was important to take a detailed look at the possible sources and routes of transmission.
- Many such potential sources are recognised (Figure 1) but the relative importance of each source is not known.
- A PCR-based test was developed to identify the main sources of infection.
- A retrospective testing strategy was employed:
  - A real time polymerase chain reaction (PCR) based on fluorescence resonance energy transfer (FRET) hybridisation probes specific for the *C. jejuni* isolated from the chickens was developed as a method of detecting different strains.
  - The strain(s) first isolated from the flock was used to generate a strain-specific marker.
  - A short variable region (SVR) between positions 450 and 500 of the flagellin A gene is flanked by regions of conserved sequences, providing an ideal opportunity for the probe development.
  - This probe was then used in a LightCycler Assay to identify potential environmental sources by screening samples, collected, stored and enriched, from before the flock became positive (Figure 2).

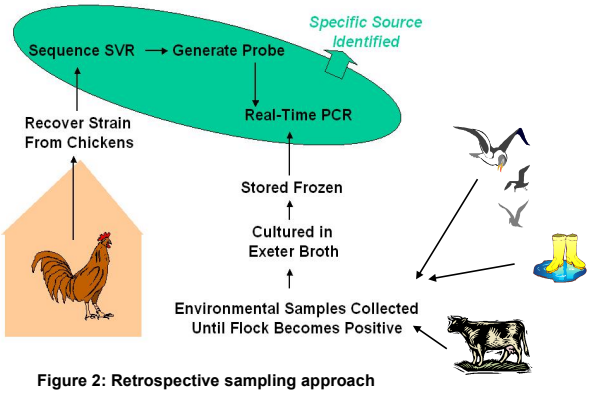

Figure 2: Retrospective sampling approach

Epidemiological Studies

Preliminary, large scale and extensively reared (organic/free-range) broiler farm studies are being conducted.

Preliminary (Pilot) – longitudinal sampling on three farms has provided a 'proof of principle' for the proposed molecular approach.

Large scale – longitudinal sampling and retrospective molecular testing of environmental samples to identify the main sources of the first colonising *Campylobacter* strain in flocks.

- Flock and environmental sampling is carried out at day of fill and then regularly from day 21 onwards.
- Environmental samples are enriched and frozen until required for screening with the probe.

Extensively reared – monitoring of successive flocks is providing additional information on *Campylobacter* infection in birds at slaughter and the 'lag phase' (time from chick placement until first *Campylobacter* infection).

Farmer Surveys

Qualitative study - to explore the attitudes of farmers to *Campylobacter* and to the control of *Campylobacter*.

- 18 interviews were conducted by three different interviewers.
- 13 of the selected farms were conventional company farms, 5 were contract farmers (2 organic farmers).

Quantitative study - the ideas and opinions from the farmers interviewed in the above study have been used to produce a structured questionnaire that will be used in a large-scale survey of poultry farmers in 2005.

Development of a practical control package

- The data from all three studies will be brought together to develop a practical control package.
- The results from each aspect of the project will be analysed and written up during 2005-2006.

Acknowledgements:
Farm visits carried out by Bristol University

Dr Viv Allen, Jill Harris, Rob Atterbury, Marie Lewis - Bristol University

Dr Anne Ridley, Meenaxi Sharma, Dr Sarah Evans, Prof. Diane Newell - VLA Weybridge

External collaborators

Farmers & Poultry Companies for the participation & support

Defra for funding the project