Pilot intervention study to reduce *E. coli* O157, *Campylobacter* and *Eimeria* in cattle in England and Wales

Authors: J. Iversen, L. Snow and R. Smith

Verocytotoxigenic *E. coli* O157 is responsible for severe disease in people.

Cattle are identified as the main animal reservoir for *E. coli* O157. In 1999, a cross-sectional survey revealed that 38.7% (CI_{95}: 28.1-50.4) of cattle herds in England and Wales were infected with VTEC O157[1]. The within herd prevalence on positive farms was reported to be 10.3% (CI_{95}: 5.8-14.8). Efficient control of VTEC at farm-level will reduce the amount entering the human food chain.

This pilot intervention study is to our knowledge the first intervention study for control of *E. coli* O157 in cattle farms in England and Wales.

OBJECTIVE
The objective was to trial intervention strategies on farms that were VTEC O157 positive.

Fig 1. Allocation and interventions applied.

82 VTEC O157 positive herds

23 Unwilling
2 Ineligible

27 Intervention herds

- Maintain a closed herd policy
- Prevent contact with live-stock on neighbouring farms
- Clean pasture management

30 Control herds

Group A (7)

Enclosure hygiene

- All animals should be visibly clean
- Maintain the animals in the same group
- Keeping the bedding and pen clean and dry
- Pen specific boot dip and overcoat
- Keep other animals away from enclosure

Group B (14)

Feed and water hygiene

- Empty and clean water troughs once a week
- Feed off the ground or in feed-specific troughs or passageways
- Removed uneaten feed before adding new
- Secure feed stores from other animals

Group C (6)

A + B

SAMPLING STRATEGY

A total of 57 VTEC O157 positive cattle farms were randomly allocated into three intervention groups and one control group (Fig. 1). The interventions were applied to one group of young-stock (<18 mths) at each farm and this group was followed over six months. Every 6-8 weeks, 20 samples were collected from fresh pooled faecal pats in the enclosures. All the samples were analysed for *E. coli* O157 and approx. half were analysed for *Eimeria spp* and *Campylobacter spp*. Compliance with interventions was assessed by questionnaires and forms filled in by the trained sample-taker at each follow-up visit.

DATA ANALYSIS

A model with generalised estimating equations allowing for repeated measurements and including the interaction group*visit term was used. The regression coefficient for each group was estimated as the change in prevalence over time and was interpreted as the estimated effect of the intervention package. A robust variance estimate was included in the model to provide valid standard errors. The model statistically compared the coefficients of the groups using the control group as baseline. Results are shown in Fig 2+3.

RESULTS

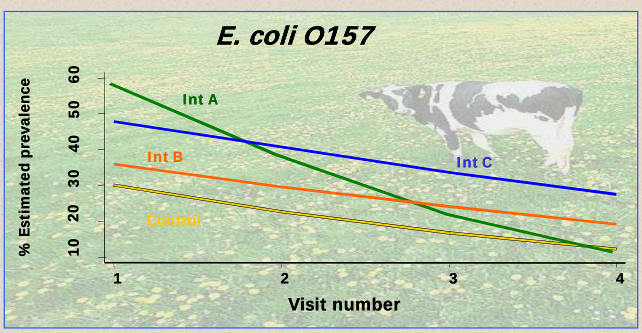

Fig 2. Effect of interventions on *E. coli* O157

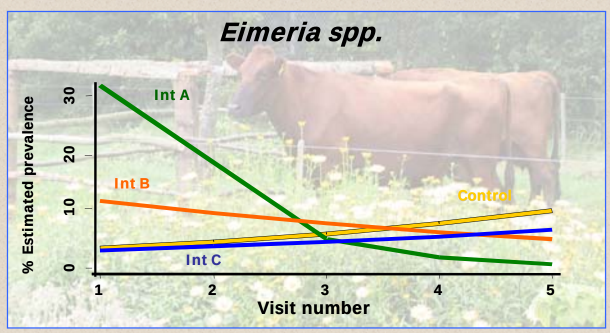

Fig 3. Effect of interventions on *Eimeria spp.*

CONCLUSIONS

- The prevalence of *E. coli* O157 decreased faster in intervention group A than in all other groups (Fig. 2).
  When the robust estimate was removed from the model, the decline became significantly different from the other groups(p=0.004)
- Intervention A seemed to have a limiting effect on *Eimeria* spp.(p=0.001) (Fig. 3).
  When the robust effect was removed both intervention A and intervention B reduced the prevalence significantly faster than the control group
- The interventions had no preventive effect on *Campylobacter* spp., as the prevalence increased throughout the study.
- Compliance with interventions was less than expected, but the study was carried out as 'intention to intervene'

ACKNOWLEDGEMENTS: The authors would like to thank collaborating colleagues at VLA, VEERU and Liverpool University.This study was funded by DEFRA under project OZ0138.
REFERENCE: (1) Paiba et al, 2003, The Veterinary Record, 153.

For further information contact:
j.iversen@vla.defra.gsi.gov.uk
www.defra.gov.uk/corporate/vla

Centre for Epidemiology and Risk Analysis, Veterinary Laboratories Agency
Addlestone, Surrey KT15 3NB, UK. Tel. 01932 341111
An Executive Agency of the Department for Environment, Food & Rural Affairs

Veterinary Laboratories Agency