

The dynamics of faecal shedding of ampicillin-resistant *Escherichia coli* by organically-reared table-chickens.

Pleydell, E. J.¹ and French, N.P.²

¹Veterinary Laboratories Agency, Weybridge, United Kingdom.

²Massey University, Palmerston North, New Zealand.

Abstract

Short-term temporal variation in the concentration of faecal *Escherichia coli* (*E. coli*) was investigated and a preliminary assessment was made of factors that may be involved in the shedding of high numbers of ampicillin-resistant-*E. coli* by growing meat birds in the absence of the use of antimicrobial drugs. The study took place over 5 consecutive days in October 2003 on a long-term organic, mixed-species livestock farm in southern England. Quantitative microbiological data were collected at the level of the individual bird and repeat measures from marked individual birds were obtained every 24 hours. Log-linear mixed-effects regression models were fitted to the data using restricted maximum likelihood (REML). It was seen that the largest component of random variation in faecal *E. coli* concentrations was between sampling occasions for individual birds, indicating that the enteric microflora of chickens exists in a highly dynamic state. Nonetheless, the incorporation of fixed effects into the model demonstrated that the older, heavier birds in the study were significantly more likely ($P = 0.0003$) to be shedding higher numbers of ampicillin-resistant *E. coli*. Furthermore, an association was seen between increasing weight and an increasing proportion of faecal *E. coli* showing resistance to ampicillin. Using real-time polymerase chain reaction, the ampicillin-resistant *E. coli* were seen to be carrying *bla*TEM-1 beta-lactamase genes. Thus this study found a weight-associated increase in the proportion of *E. coli* that were carrying ampicillin-resistance genes in chicken faecal droppings even though antimicrobials had not been consumed by the birds under study. This work has provided evidence that the prudent use of antimicrobials on a farm will not necessarily result in the elimination of antimicrobial-resistant bacteria from the farm environment and suggests that field-strains of *E. coli* are capable of adapting to ameliorate costs in biological fitness imposed by the carriage of certain resistant genes.