Quantitative microbiological data analysis of a Campylobacter vaccination trial

Campylobacter jejuni is considered the main pathogen causing human campylobacteriosis and poultry has been identified as one of the main risk factors. Strategies that aim to control Campylobacter in poultry such as vaccination strategies could reduce the incidence of human campylobacteriosis. The objective of the present trial was to assess whether or not a vaccine candidate could give a 2 logs reduction of the numbers of Campylobacter in broilers. Sample size calculations indicated the use of 400 animals (200 vaccinated and 200 controls). The experiment was conducted in four different rotations using 8 incubators per rotation with 10 chickens in each incubator. The vaccination treatment was randomly assigned at incubator level. Broilers were challenged with C. jejuni at day 31 and faecal/caecum samples were collected at slaughter at day 42 and processed in the laboratory. To illustrate the importance of analysing the data in accordance with the setup of the study, the data was analysed both without and with taking the nested design into account. Initially, the effect of the vaccine was analyzed using all data in a t-test. Subsequently, the t-test was stratified by rotation. Finally, mixed linear models were used, taking into account the physical hierarchical setup of the trial. Results from the t-test indicate an effect of the vaccine, whereas the result obtained from mixed linear models indicated high variability between birds and isolators but not significant vaccine effect. The apparent observed differences between vaccinated and placebo groups in the t-tests could be attributed to the variation between incubators. Broilers in the same isolator had more equal numbers of C. jejuni compared to chickens in other incubators. It is possible that chickens in the same isolator re-infect each other with Campylobacter.

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