Farm specific risk factors for Campylobacter colonization of broilers in six European countries

Borck Høg, Birgitte; Sommer, Helle Mølgaard; Williams, N.; Merga, Y.; Cerda Cuellar, M.; Dolz, R.; Wieczorek, K; Osek, J; David, B.; Hofshagen, M.; Wagenaar, J.; Bolder, N. M.; Rosenquist, Hanne

Publication date: 2015

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
FARM SPECIFIC RISK FACTORS FOR CAMPYLOBACTER COLONIZATION OF BROILERS IN SIX EUROPEAN COUNTRIES


INTRODUCTION

What:
This study, part of the EU financed CamCon project, presents the results from a multi-national risk factor study, where farm data were collected through a standardised questionnaire survey carried out in six EU countries: Denmark, Norway, the Netherlands, Poland, Spain and the UK.

Why:
To identify common and country-specific, on-farm risk factors that can be used to identify the most efficient on-farm measures for preventing broiler flocks from becoming colonized with Campylobacter (See presentation by H.M. Sommer, Wednesday morning

How:
By applying a variance model that handles the explanatory variables in the generalized linear model using backward elimination and forward selection

RESULTS

Several models were explored by applying different strategies for categorizing the explanatory variables and for selecting and eliminating variables for the final model. The observed Campylobacter prevalences are shown in Figure 1. A clear seasonal distribution, with low prevalences during the winter months was seen in DK, NO and the NL. In ES, PL and the UK, the prevalence never went below 26%, 59% and 29%, respectively.

Figure 1: Observed Campylobacter prevalence in DK, ES, NL, NO, PL and the UK

Table 1: Significant risk factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect on prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Campylobacter positive flocks, in descending order: PL, ES, UK, NL, DK and NO</td>
</tr>
<tr>
<td>Temperature</td>
<td>Increasing temperature, increasing number of positive flocks</td>
</tr>
<tr>
<td>Age of house</td>
<td>Newest house = lower prevalence</td>
</tr>
<tr>
<td>Biosecurity</td>
<td>Anteroom + barrier = lower prevalence</td>
</tr>
<tr>
<td>Biosecurity</td>
<td>Designated tools = lower prevalence</td>
</tr>
<tr>
<td>Downtime</td>
<td>Low downtime = lower prevalence</td>
</tr>
<tr>
<td>Drinkers</td>
<td>Nipples without cups = lower prevalence</td>
</tr>
</tbody>
</table>

The probability of broiler flocks becoming colonized with Campylobacter was clearly affected by country. In descending order; broiler flocks were more likely to be colonized in Poland, the UK, Spain, the Netherlands, Denmark and Norway due to country specific factors that could not be explained by the management and climate variables that we explored in the models.

The seasonality in the prevalence of Campylobacter was described nicely by temperature, i.e. the Campylobacter prevalence increased with increasing outside temperatures. The age of broiler houses, presence of anterooms and barriers in all houses, designated tools for each house as well as length of downtime and the type of drinker systems were found to significantly affect the probability of the broiler flocks becoming colonized by Campylobacter, Table 1 and Figure 2.

Contact information: Birgitte Borck Høg: bibo@food.dtu.dk, Helge Melgaard Sommer: hems@dtu.dk

METHOD

We obtained Campylobacter data through existing Campylobacter surveillance programmes in DK and NO and through a two-year survey of flocks on 20 selected farms in ES, NL, PL and UK. The study included Campylobacter status data from more than 6000 flocks and 44 explanatory variables.

The data was analysed using a generalized linear model with a logit link function.

\[
\text{logit}(p_{i,j,k,...}) = \log \left( \frac{p_{i,j,k,...}}{1 - p_{i,j,k,...}} \right) = \beta_0 + \beta_1 X_1 + \cdots + \beta_k X_k + \cdots
\]

where, \( p_{i,j,k,...} \) is the prevalence value, \( \beta_i X_i \) express a regression term with temperature, \( \beta_k \) express a categorical term. The number index for the betas (1, 2, ..., etc.) refers to the question number in the questionnaire (Høg et al. 2013).

The analyses was carried out by using PROC GENMOD in SAS (version 9.4, SAS Institute Inc.). The unit of analysis was the number of positive flocks out of the total number of flocks per farm. Significant risk factors were found by backward elimination and stepwise forward selection (Sommer et al, 2013).