Farm specific risk factors for Campylobacter colonisation in Danish and Norwegian broilers
- DTU Orbit (23/12/2018)

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Campylobacteriosis has become the leading bacterial zoonosis in humans in the European Union and other developed countries. There are many sources of human Campylobacter infections, but broilers and broiler meat have been shown to be the most important. In order to implement effective interventions that reduce the probability of Campylobacter colonisation of broiler flocks, it is essential to fully understand the risk factors involved. We present a bi-national risk factor survey comprising Campylobacter data from more than 5200 Danish and Norwegian indoor, conventional broiler flocks and the responses to a standardised questionnaire, with more than 40 explanatory variables from 277 Danish and Norwegian farms. We explored several models by using different combinations of the Danish and Norwegian data, including models with single-country datasets. All models were analysed using a generalized linear model using backwards elimination and forward selection. The results show that Norwegian broiler flocks had a lower risk of being colonised than Danish flocks. Farm specific variables that increased the risk of flocks becoming colonised with Campylobacter in both countries were: broiler houses older than five years; longer downtime (no. of days between flocks), probably a consequence of longer downtimes being associated with less focus on maintaining a high biosecurity level; broiler houses without a separate ante-room or barrier; and the use of the drinker nipples with cups or bells compared with nipples without cups. Additional country specific risk factors were also identified. For Norway, the risk of colonisation increased with increasing numbers of houses on a farm and when the water used for the broilers originated from surface water or bore holes instead of mains. For Denmark, having boot dips or low stocking density increased the risk of a flock becoming Campylobacter positive. The different model approaches allowed us to explore the effect of having a large number of data available to identify the significant variables. To a large extent, the country specific models identified risk factors that were also found in the bi-national model. However, the bi-national model identified more risk factors than the country specific models. This indicated that combining the data sets from the two countries did not disrupt the results but was beneficial due to the greater strength achieved in the statistical analyses and the possibility of examining interactions terms with the variable Country.

General information
State: Published
Organisations: National Food Institute, Division of Risk Assessment and Nutrition, Department of Applied Mathematics and Computer Science, Norwegian Veterinary Institute
Number of pages: 9
Pages: 137-145
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Preventive Veterinary Medicine
Volume: 130
ISSN (Print): 0167-5877
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.26 SJR 1.144 SNIP 1.31
Web of Science (2017): Impact factor 1.924
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.2 SJR 1.249 SNIP 1.361
Web of Science (2016): Impact factor 1.987
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.1 SJR 1.282 SNIP 1.177
Web of Science (2015): Impact factor 2.182
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.37 SJR 1.27 SNIP 1.407
Web of Science (2014): Impact factor 2.167
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2