A case-control study of risk factors for bovine cysticercosis in Danish cattle herds

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Objective

To quantify associations between potential risk factors and bovine cysticercosis in dairy and beef cattle at herd level for potential use to select animals from high-risk herds for future risk-based meat inspection in Denmark

Materials and Methods

- 308 herds included in the study
  - 202 dairy and veal producers. 49 case herds, 153 control herds
  - 106 beef producers. 28 case herds, 78 control herds
- Case herd definition
  - herds hosting at least one animal diagnosed with bovine cysticercosis at meat inspection for >100 days in period January 2006 to March 2010 (n=77)

- Control herd definition
  - herds not hosting any animals diagnosed with bovine cysticercosis at meat inspection in the period January 2004 to March 2010
  - three control herds were selected per case herd by random sampling, stratified on dairy and beef herds (n=231)
- Farm managers interviewed by telephone regarding cattle production, management practices, farm location, staff and visitors
- Univariable analyses and multivariable logistic regression analysis performed with forward inclusion of variables Significant interactions only kept in model if meaningful. Significance level was set to 5% in regression analysis

Fig. 1 Distribution of bovine cysticercosis case herds, potential case herds, selected control herds and other active cattle herds in Denmark from 2006 to 2010. No obvious clustering.

Results

Animals grazing and farming type $P = 0.037$

Levels	OR	95% CI
All animals grazing, organic	2.5	1.1 - 6.0
All animals grazing, conventional	2.0	1.0 - 4.1
Non or some animals grazing, conventional	1.0	

Herd size $P < 0.0001$

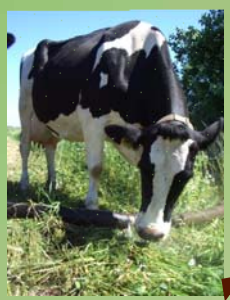
OR=1.5, 95% CI: 1.2 - 1.8 per 100 animals increase in herd size

Persons with daily access to farm area >50 yrs old $P = 0.013$

OR=2.4, 95% CI: 1.2 - 4.8 compared to herds where persons with daily access were below 50 years old

Higher risk of having infected people on farm?
Or behavioural difference?.

RISK FACTORS FROM MULTIVARIABLE MODEL



Access to risky water source (stream, river or surface water)
and
Sewage treatment plant in proximity $P = 0.002$

OR= 2.5, 95% CI: 1.1 - 5.6 compared to herds in which there are no sewage treatment plants in the proximity

Share machinery or hire contractors $P = 0.028$

OR= 5.7, 95% CI: 0.9 - 36.5 compared to herds not using shared machinery
Note that very few herds did not use shared machinery
Not feasible factor in a risk-based surveillance system

Conclusions and Perspectives

- This study supports previous studies where cattle drinking from risky water source (usually surface water) in combination with having a sewage treatment plant in the proximity of the farm were major risk factors
- Grazing was significantly associated with finding carcasses with bovine cystercosis at meat-inspection, regardless of farming type indicating that using organic farming for selection of high-risk herds is most likely insufficient
  Food chain information might be useful to record cattle that have been grazing.
- There is no clear reason why persons >50 yrs old are more risky on farm, but it might be related to higher risk of being infected with *Taenia saginata* or it is an indicator of certain unknown farming practices
- Large herds are more likely to have at least one test-positive animal identified at meat inspection probably due to increased herd level sensitivity when testing more animals. Analysis of animal level data might add more information for risk-based systems.

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