

Considerations for risk mitigation of *Toxoplasma gondii* in pigs originating from different production systems in Denmark

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INTRODUCTION

Humans are at risk of infection with *T. gondii* parasites via consumption of undercooked meat from infected animals

The apparent prevalence of *T. gondii* varies between pig populations in Northern and Western Europe, from low (0.4 – 3%) in conventional finishers to medium in pigs from organic and free-range production systems (6 – 11%) and high in sows (32 – 36%)

In the EU, there is no official requirement for surveillance or control of *T. gondii* in pigs or pork

To improve food safety, EFSA recommends using food chain information based on auditing of biosecurity or serology

OBJECTIVES

- 1) Estimate seroprevalence of *T. gondii* in each of the four pig subpopulations i.e., conventional finishers, conventional sows, organic finishers, organic sows in Denmark
- 2) Estimate the effect of risk factors, age and production system on the prevalence of *T. gondii* in Danish pigs
- 3) Estimate time to detection of a seropositive animal in each subpopulation using Danish abattoir data for use in a potential future surveillance programme

METHODS

Blood-plasma samples collected in 2017-18 from 447 Danish pigs were analyzed using PrioCHECK IgG antibody ELISA kit using the recommended cut-off value of 20 percent positivity (PP)

A hierarchical model was built using the “lmer” package in R to estimate the apparent seroprevalence and assess the effect of two risk factors for *T. gondii*

Abattoir data from 2018 were used to quantify time to detection in each of the four sub-populations by testing 2 or 6 samples from each batch delivered to the abattoirs

RESULTS

- ✓ The apparent seroprevalence of *T. gondii* was 2% in conventional finishers, 11% in organic finishers, 19% in conventional sows and 60% in organic sows
- ✓ The odds of testing positive for *T. gondii* was 16 times higher in a pig from organic (CI_{95%} = 4.6 – 74.3) than conventional farms. The odds were 22 times higher if the animal was a sow (CI_{95%} = 6.5 – 88.3) than a finisher. There was no significant interaction between age (sow or finisher) and production system
- ✓ Three factors affected the time-to-detection:
 1. The observed variation in the seroprevalence in the four production systems
 2. The frequency of delivery and the batch size
 3. The number of samples (2 or 6) analysed in relation to each batch delivery

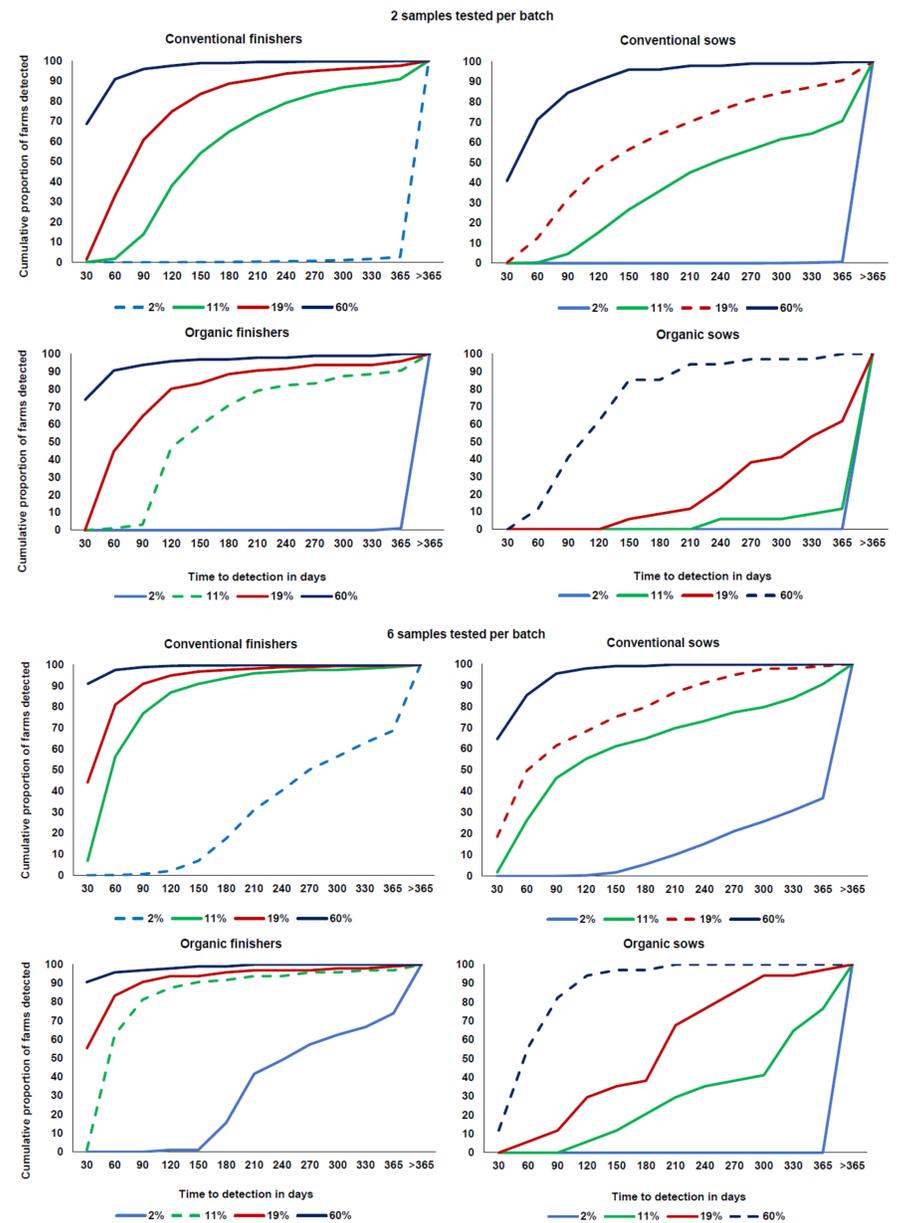


Fig 1. Time to detection of *Toxoplasma gondii*

Fig 1 shows the cumulative proportion of farms that met the sample size required to detect at least one *T. gondii* positive pig, when testing 2 or a maximum of 6 pigs per batch delivery. The four lines in each plot indicate the estimated average time in days to detect one positive pig based on the frequency at which these pigs are sent to the abattoirs, and seroprevalence of 60%, 19%, 11% and 2%

The dotted line in Fig 1 indicates the time to detection estimated for the production type (based on observed seroprevalence), where the other three non-dotted lines represent seroprevalence estimates for the remaining production systems

DISCUSSION

Time to detection will be longer for indoor finishers due to low prevalence and, in many sow herds, because of intermittent delivery of a low number of sows. For outdoor finishers, time to detection will be shorter due to medium prevalence and frequent delivery of high number of finishers

Collection of 6 samples instead of 2 per batch will reduce time to detection, but increase costs

The cost effectiveness of surveillance needs to be considered further: auditing of biosecurity and heat-treatment of sow meat for risky ready-to-eat products, might be more cost-effective alternatives

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