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Surveillance of Campylobacter ssp. in broiler flocks by PCR on boot sock samples

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Background: Surveillance of Campylobacter in broilers is traditionally based on microbiological culture of faecal samples from cloacae or caecum collected at the abattoir. Due to long time needed for analysis, no intervention can be taken in order to prevent meat from positive flocks for being sold on the fresh market. Furthermore, many efforts is taken to increase biosecurity at farm level and the number of positive flocks are decreasing, however the negative flocks may be cross-contaminated during slaughter. To know the Campylobacter status of the broiler flock before arriving at the abattoir, a surveillance system based on in-flock sampling using one pair of boot sock combined with PCR detection was established and validated.

Methods
- One pair of sock samples were collected by the farmer 2-10 days prior to slaughter and 10 cloacal swabs were collected at the abattoir.
- All samples were submitted to the laboratory using ordinary mail.
- Fecal material was eluted from the socks or the swabs, and following the addition of a internal purification and PCR control (Yersinia ruckerii), total DNA was purified using magnetic beads.
- DNA was added to a multiplex mastermix containing genus specific primer pairs targeting 16S rDNA in Campylobacter ssp. and Yersinia ruckerii.
- PCR products were visualized by gel electrophoresis.

Results
- A genus specific multiplex PCR assay to detect Campylobacter ssp. in fecal samples was established and validated.
- The addition of an aquatic bacteria, Yersinia ruckerii, to the sample served as internal control both during DNA purification and through out the PCR detection.
- Sensitivity of the assay was 100-300 CFU/ml when negative samples were spiked with Campylobacter jejuni before DNA purification, corresponding to 10^3 CFU / gram feces.
- When sampling was preformed 6-10 days prior to slaughter, we found a correlation between the socks and the swab at slaughter below 67%.
- For sampling on day 5 or less we found a correlation of 80% or higher.

Conclusions
- With the combination of a sensitive PCR method and boot sock sampling, it is possible to detect Campylobacter in the broiler flock.
- Boot socks is an easy and low cost sampling method. It can be preformed by the farmer, and socks may be submitted by ordinary mail. At the laboratory the analysis can be performed within the same day.
- Due to colonisation dynamics and late introduction of Campylobacter in the flock, the predictive value of sock sampling increases when approaching the day of slaughter.
- The lower predictability of the test early in the growing period indicates that if testing is preformed before day 32, a higher number of socks needs to be taken in each flock.

Impact
- By knowing the status of the flock before it reaches the abattoir, negative flocks may be slaughtered before positive, and the number of Campylobacter in meat from positive flocks may be reduced by freezing or marinating.