Liver fluke infections in Danish cattle: epidemiology, diagnostics and control

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The prevalence of *Fasciola hepatica*, the liver fluke, among Danish cattle has increased in the last few years; a study based on meat inspection data of approx. 1.5 million cattle showed a herd prevalence of 29% in 2013, an increase of 3.7 percentage points from 2011. In cattle, fasciolosis often manifests as subclinical infection and may be evident as reduction in production parameters, e.g. milk production, fertility (increased calving interval and need for additional services), and weight gain, depending on age group. As anthelmintic resistance in *F. hepatica* is increasingly reported in Northern Europe, it is necessary to develop effective control strategies with minimal risk for development of anthelmintic resistance, e.g. through grazing management. For this purpose, a risk factor analysis and a longitudinal study to assess infection dynamics were carried out.

In order to identify key risk factors for fasciolosis in Denmark, a questionnaire survey was conducted in 2014 by interviewing 132 case (minimum 3 cases of liver condemnation due to liver flukes at slaughter) and 64 control dairy farms (no history of liver condemnation due to liver flukes during 2011-2013; within 10 km of case farms). Bulk tank milk (BTM) samples from these farms were also collected and analysed by ELISA for comparison with results of meat inspection data. In order to focus only on risks associated with grazing, 12 case and 16 control farms that did not practice grazing during 2013 were excluded from the risk factor analysis. Preliminary results suggest that heifers grazing predominantly on wet pastures, dry cows grazing on wet pastures, cross breeds and purchasing of cows were identified as risk factors for fasciolosis. The herd prevalence of liver flukes estimated by BTM ELISA was 75% and 12.5% for case and control groups, respectively. The inconsistencies between BTM ELISA and meat inspection data are suspected to be due to the detection limit of BTM ELISA test and low sensitivity of slaughter inspection. Among the 12 non-grazing case herds, five were positive by BTM ELISA with low to moderate infection levels. Four of the five farmers did not purchase any calves, heifers, or cows during 2013. Possible infection routes in such non-grazing herds may be freshly cut grass (as well as hay and silage on rare occasions) and metacercariae-contaminated water source. About one third of the case farms (28.8%) used flukicides in 2013, highlighting the difficulty of liver fluke control.

In Denmark, infection pressure is suggested to be highest in late summer, as it takes approx. 10-12 weeks for metacercariae to develop from eggs, which are deposited on pasture by infected cattle after turn-out. A previous study in 1970s suggested that infected snails may also over-winter and thus metacercariae can alternatively develop in large numbers during spring under the Danish climate. In order to determine the significance of this over-wintering infection and also to determine the infection dynamics at farm level, four dairy farms (two conventional and two organic), with known high herd prevalence of fasciolosis, were selected for a longitudinal study. A total of 44 animals from four different age groups (calves, heifers, young and old cows) are being followed for approx. 1.5 years using three different diagnostic methods: detection of eggs by sedimentation, detection of antigen in faeces by ELISA and detection of antibodies in serum by ELISA.

Additionally, BTM are collected each month to follow the seasonal trend of antibody concentrations at herd level. Data from the first two samplings (turn-out and mid-summer 2015) showed high infection levels in young and old cows (39.1% and 39.8%) compared to heifers and calves (6.1% and 0%) and no indications of early infections.

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