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Milk Yield and *Salmonella* in Dairy Cattle Herds

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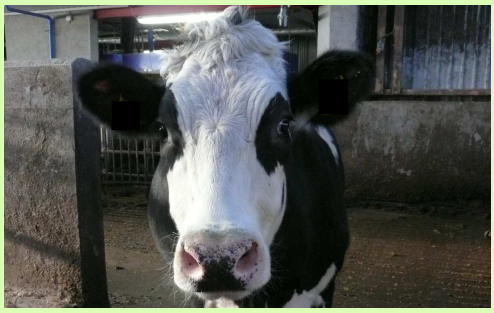


Background and Objective

Salmonella infection in cattle has long been reported to affect milk yield. However, no studies to date have quantified milk yield loss over an extended period of time or estimated how long it takes before yield is back to pre-infection levels.

Objective: To quantify milk yield losses associated with *Salmonella* in dairy cattle herds

Materials and methods

Study population: 68 Danish Holstein herds, >40 cows in total included, in total 11.959 cows

Case herds (n=28)
Herds active between 2005-2009 with a minimum of 1 year of low bulk-tank milk *Salmonella* antibody levels (<10 ODC%) followed by increase to high *Salmonella* antibody levels (≥70 ODC%).
Estimated infection date = date of high bulk-tank milk value - 61 days

Control herds (n=40)
Low bulk tank milk antibody levels (<10 ODC%) 2005-2009
Artificial infection date weighted by year and month to match case herds

Control herds were used to evaluate whether the effects in the case herds could be reproduced in herds without *Salmonella* infection

Statistical analysis:

Daily milk yield (kg ECM) modelled in multilevel hierarchical model with 3 levels: yield, cow and herd with repeated measurements for yield recordings. Parity 1, 2, and 3+ modelled separately

Time from estimated herd infection included in 3-month intervals (T), where T_0 was 0-3 months after infection, T_1 was 4-6 months after and T_{-1} was 3-0 months before herd infection. Milk yield recordings from 12 months before to 18 months after estimated herd infection (T_{-4} – T_5) were used.

Year, season for milk recording, DIM, Log(SCC) was included as confounders at yield level and average herd size in the study period at herd level
Wilmink's function ($e^{-0.05*DIM}$) was also included

Results and Conclusions

Results:

Reduced yield in parity 1 and 3+ 6-15 months (T_2-T_4) after herd infection date (Fig. 1). Mean loss for parity 1 cows was 1.4 kg ECM/cow/day (95% CI:0.5-2.3) and 3.0 kg ECM/cow/day (95% CI: 1.3-4.8) for 3+ parity cows, when compared to cows in same parity before herd infection. Only minor differences before and after the infection date was seen in parity 2 cows

For a herd with 100 "year-cows" with 36, 32 and 32% cows in parity 1, 2 and 3+ respectively, these results indicate a mean reduced yield of 40,000kg ECM (95% CI: 8,000-153,000) in the 18 months after herd infection date

Year, season, DIM and Log(SCC) were significantly associated with daily milk yield, but herd size was not. There was no effect in simulated infection date in control herds

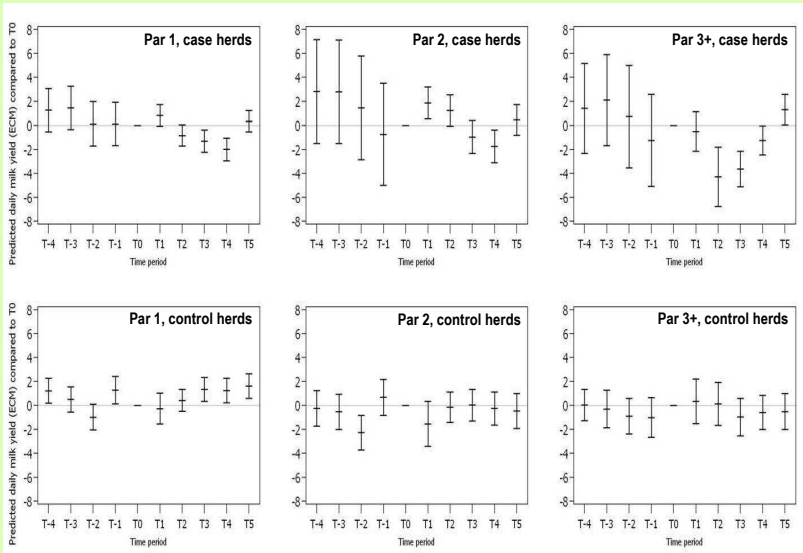
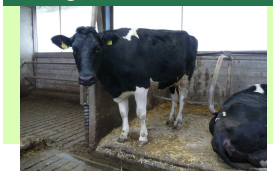


Fig. 1 Predicted mean daily milk yield (Kg ECM) compared to T_0 for case and control herds

Conclusion:

Introduction of Salmonella to the herd is associated with large reduction in milk yield for cows in parity 1 and 3+. It takes on average about 15 months before yield is back to pre-infection levels



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