Investigation of *Coxiella burnetii* following parturition: A freshspotlight on a neglected disease in Scotland

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Objective: Suboptimal fertility and increased rates of post-partum reproductive disease were reported by a high producing commercial dairy farm in Scotland in 2021. The farm tested positive by both PCR and ELISA for *C. burnetii* in bulk tank milk. The objective of this study was to determine the within-herd prevalence and examine bacterial shedding of *C. burnetii* on a commercial dairy farm with previous history of *C. burnetii*. Farm managerial software data used to monitor production will aid in finding potential impacts of this pathogen on the study herd.

Methods: A 900-cow commercial dairy farm in Scotland, UK was recruited. Vaginal swabs were collected from cows within seven days after parturition. Samples were stored in DNA/RNA shield and heat treated at 70°C for one hour prior to processing for DNA extraction at the University of Glasgow. Extracts were qPCR tested for *Coxiella burnetii* DNA using an IS1111 assay. Samples were considered negative if they did not amplify or amplified with a Cycle Threshold (Ct) $\geq$ 40. Samples with Ct < 40 and > 35 were classified as inconclusive. Samples with Ct $\leq$ 35 and > 27 were classified as positive. Samples with Ct $\leq$ 27 were classified as high load positive. Data was extracted from DairyComp305 (Valley Ag Software, 2023) to examine production data from the recruited individuals. Data processing occurred in R.

Results: A total of 352 vaginal swabs were collected between Dec 2022-Aug 2023. Of that, 336 (95.4%) of these had detectable *C. burnetii* (combining inconclusive, positive and high load positives). Within this, 63 (19.3%) of tested swabs were classified as high load positive, 234 (71.8%) as positive and 14 (4.3%) as inconclusive for *C. burnetii* detection. All primiparous cows scored Ct $\leq$ 35 and were more likely to be positive via qPCR (combining positive and high positive animals to compare to inconclusive and negative animals) than multiparous cows. Cows with lower Ct scores produced lower volumes of milk collected during the first four weeks of lactation.

Conclusions: The qPCR data indicated a high prevalence of *C. burnetii* being shed amongst herd members and nearly a fifth of post-parturient cows were shedding high concentrations of bacteria. Cattle in their first lactation were more likely shed *C. burnetii* in this herd. Individuals shedding more bacteria produced less milk in the first four weeks of lactation indicating possible production impacts of this infection.