University of Prince Edward Island

Faculty of Veterinary Medicine
Summary of Dissertation

Submitted in Partial Fulfilment
of the Requirements for the

DEGREE OF DOCTOR OF PHILOSOPHY

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Surveillance, Control, and Epidemiological Implications of Bovine Leukemia Virus Infection in Dairy Herds Using Bulk Tank Milk and Proviral Load–Based Strategies

This doctoral research comprises four interrelated studies conducted in the Canadian Maritimes (New Brunswick, Nova Scotia, and Prince Edward Island) to investigate the role of bovine leukemia virus (BLV) proviral load (PVL) in surveillance, control programs, and dairy production.

The first study developed and validated a stable, practical, and cost-effective statistical model to estimate within-herd BLV prevalence using bulk tank milk (BTM) ELISA titers. Over three years, 30 herds were sampled bimonthly with annual individual testing. Seven regression models were evaluated; the model based on the average of two BTM samples collected two months apart performed best (R^2 = 0.91; predictive R^2 = 0.90). This tool enables efficient, low-cost BLV surveillance.

The second study evaluated three control strategies targeting high-PVL cattle in 21 herds over three years: (1) culling all high-PVL cows; (2) culling some and segregating the rest; (3) culling some without segregation. Median prevalence decreased from 36% to 24%. The greatest reductions occurred with complete culling or culling plus segregation. One herd became BLV-free, and two others eliminated all high-PVL cows.

The third study assessed associations between high PVL and milk yield, composition, subclinical mastitis, ketosis, and reproduction in 25 herds. High-PVL cows had reduced 305-day milk yield (387–431 kg), longer calving-to-conception interval (~50 days longer), and increased odds of subclinical mastitis (OR = 2.38–2.48). The negative production findings further support prioritizing high-PVL cows for removal from the herd.

The final study monitored PVL in BLV-positive cows for three years. Twelve percent of low-PVL and 51% of moderate-PVL cows progressed to high PVL, while a small subset (n=20) remained seropositive with undetectable PVL, suggesting host resistance. These findings underscore the importance of PVL monitoring and potential genetic factors in BLV control.

Publications

Bourassi S., Jack H., Florczyk A. Use of a Fogarty balloon catheter for management of distal nasolacrimal duct atresia in a standing sedated horse. Accepted by Canadian Veterinary Journal in August 2025.

Bourassi S., McKenna S., Keefe G., John E., VanLeeuwen J., Bourassi E., McClure J. Impact of high proviral load on milk production, reproduction and subclinical diseases in dairy cows infected with Bovine Leukemia Virus. Frontiers in Veterinary Science, March 2025 doi 10.3389/fvets.2025.1522089

Saliou G., d'Ablon X., Theaudin M., Saliou T., Bourassi S. Cerebral Computed Tomography Scan demonstrating ischemic stroke in a filly after intravenous antibiotic administration. Journal of Equine Veterinary Science 88, May 2020 doi 10.1016/j.jevs.2020.102953

Bourassi S. Dystocia in donkeys carrying mule foals : an evaluation of 32 cases of dystocia presented to the SPANA clinics in Morocco between 2002 and 2005, WEVA proceedings 2006

Bourassi S., Kay G. Farrier techniques in the donkey and the mule. Pratique Veterinaire Equine 2005, 37 (148): 15-19.

Presentations

Conference of Research Workers in Animal Diseases, Chicago, US - January 2023
Oral presentation: Multilevel modeling: Association between bovine leukosis proviral load and dairy production parameters

Atlantic Association of Bovine Practitioners (ABPA) Annual Conference, Moncton, NB, November 2022
Oral presentation: Bovine leukosis research project update and preliminary results

Annual UPEI Graduate Studies and Research Conference - October 2022
The impact of removal or segregation of cattle with high proviral load on reducing incidence and prevalence of bovine leukaemia virus in 25 dairy herds

16th International Symposium of Veterinary Epidemiology and Economics (ISVEE), Halifax - August 2022
Oral presentation: Linear regression model to estimate the within herd prevalence of bovine leukemia virus from antibody titers detected by ELISA in bulk tank milk

Poster presentation: The impact of removal or segregation of cattle with high proviral load on reducing incidence and prevalence of bovine leukaemia virus in 25 dairy herds

6th Annual All Things BLV Conference, Michigan State University (Online) - October 2021
The impact of removal or segregation of cattle that have a high proviral load of bovine leukemia virus (BLV) in reducing incidence and prevalence of BLV in dairy herds in the Canadian Maritimes.

Annual UPEI Graduate Studies and Research Conference (OnLine) - October 2021
Elaboration and stabilisation of linear regression model to estimate the within herd prevalence of bovine leukemia virus from the antibody's titer detected by ELISA in BTM during three years

Biographical Data –

Born in Morocco