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UNIVERSITEIT GENT

INVITATION PUBLIC DEFENSE

Bovine respiratory health through a microscope's lens

Characterization and integration of airway cytology into a multidimensional diagnostic approach of respiratory tract infections in calves

Justine Clinquart

September 25th 2025

PROMOTORS

Prof. dr. B. Pardon
Faculty of Veterinary Medicine, UGent

Dr. J. Bokma
Faculty of Veterinary Medicine, UGent

Curriculum Vitae

Justine Clinquart was born in Duffel on 9 April 1996. After completing a Master's degree in Veterinary Medicine with a specialization in ruminants at Ghent University, Justine began a rotating bovine internship at the Department of Internal Medicine, Reproduction, and Population Medicine. She then started a Ph.D focused on respiratory cytology in calves, under the supervision of Prof. Dr. B. Pardon and Dr. J. Bokma. Alongside her research, she worked in the ruminant clinic, contributed to the training of master's students, and delivered several post-graduate continuing education sessions on the medical care of alpacas and small ruminants.

Justine is (co-)author of several articles published in international journals and has presented her work at various international veterinary conferences. She was awarded the prize for best poster at the camelid congress in Vienna in 2023.

Where?

The defense will take place on **Thursday September 25th** 2025 at **17.00h**

Auditorium B
Faculty of Veterinary Medicine
Ghent University, Campus Merelbeke
Salisburylaan 133, Merelbeke

After the defense a reception will take place in the Resto of the faculty, accompanied with drinks and bites.

How to attend?

If you would like to attend the reception, please register before **September 6th** via this form or via Justine.Clinquart@UGent.be.
This way, I can ensure that everyone will be sufficiently catered for. Feel free to let me know if you are vegetarian or have any allergies.

Members of the Jury

Prof. dr. S. Croubels
Chair of the Jury
Faculty of Veterinary Medicine, UGent

Dr. F. Boyen (Dipl. ECVM)
Faculty of Veterinary Medicine, UGent

Dr. J. D. Donlon (Dipl. ECBHM)
Faculty of Science and Health, Atlantic Technological University, Ireland

Dr. K. van Leenen
Faculty of Veterinary Medicine, Utrecht University, The Netherlands

Prof. dr. G. Opsomer (Dipl. ECAR and ECBHM)
Faculty of Veterinary Medicine, , UGent

H. Versnaeyen (Dipl. ECVP and ACVP)
Faculty of Veterinary Medicine, UGent
Idexx laboratories, The Netherlands

Summary

Respiratory tract infections (RTIs) in calves are a leading cause of morbidity, production losses, and antibiotic use, raising concerns about antimicrobial resistance and compromised animal welfare. To address these challenges, respiratory sampling is increasingly used to guide treatment and prevention strategies. However, interpreting microbiological results remains difficult, particularly for opportunistic bacteria such as *Pasteurellaceae*. These bacteria are frequently found in both diseased and healthy animals, complicating diagnosis. Cytologic analysis of bronchoalveolar lavage fluid (BALf) may offer additional diagnostic value by evaluating the host immune response. However, due to limited research on BALf cytology in cattle, its use remains uncommon in both clinical and research settings. In the last decade, on-farm use of thoracic ultrasonography emerged as a tool to guide antibiotic treatment with good diagnostic accuracy. Nevertheless, the relationship between ultrasonographic lung consolidations and underlying bacterial infections remains poorly understood.

The overall aim of this thesis was to investigate the value of integrating cytology of BALf, obtained via non-bronchoscopic bronchoalveolar lavage (nBAL), into the diagnosis of RTIs in calves. This was done by evaluating methodological consistency and characterizing cytological findings in relation to different pathogens (including opportunistic bacteria), thoracic ultrasonographic findings, and herd-level disease dynamics.

Firstly, a reference framework for cytology of nBAL was identified using a cluster analysis in herds without outbreaks of respiratory disease. Secondly, differential counts based on a reduced amount of cells proved to be reliable. Thirdly, associations were found between neutrophilia and both lung consolidations and the presence of pathogens in herds with outbreaks of respiratory disease. While no substantial differences in neutrophilia were observed between specific pathogen groups, the presence of intracellular bacteria was associated with opportunistic bacteria. Lastly, thoracic ultrasonographic consolidation depth could be associated with several pathogens such as opportunistic bacteria, viruses and *Mycoplasmopsis bovis*.

Overall, this thesis highlights the potential of cytologic analysis of BALf, especially as nBAL sampling becomes more widespread. The established reference framework can contribute to an improved definition of a respiratory-healthy calf. The identification and characterization of several cytological findings in RTIs and their association with several pathogen groups enhance the interpretability of routinely collected BALf samples. The validation of a more time-efficient differential count could facilitate the implementation of cytology in both research and practice. Additionally, the valuable role of thoracic ultrasonography and the 1 cm consolidation depth threshold in the diagnosis of RTIs was further established. Overall, these findings represent an important step toward integrating cytology into a multidimensional diagnostic approach for RTIs in calves. This knowledge can improve the diagnosis of RTI and contribute to rational antimicrobial use.