

INVITATION PUBLIC DEFENCE

Surveillance of bovine and porcine
coronaviruses with emphasis on their
zoonotic risk

Ruth Mwende Mumo

29th October 2026

PROMOTORS

Prof. dr. Kristien Van Reeth
Faculty of Veterinary Medicine
Ghent University

Prof. dr. Bart Pardon
Faculty of Veterinary Medicine
Ghent University

Curriculum Vitae

Ruth Mwende Mumo was born in Zürich, Switzerland, on March 8th, 1988. She completed a Bachelor of Science degree in biochemistry and molecular biology, graduating in 2009 with second class honours at the Jomo Kenyatta University of Agriculture and Technology. She then enrolled at the University of Nairobi for a Master of Science degree in biochemistry, graduating in 2013. Her master's thesis was on the safety and efficacy of a malaria candidate DNA vaccine in a murine model. This study was conducted at the Kenya Institute of Primate Research (KIPRE), where she stayed until 2015 as a research fellow in the malaria research laboratory and the Barcode of Wildlife Project. In 2016, she joined the National Public Health Laboratories under the Ministry of Health (Kenya) as a senior medical laboratory specialist. In 2021, she started her PhD at the Laboratory of Virology, Faculty of Veterinary Medicine, Ghent University. Here, she worked on the CORUVA ("Surveillance van **CO**ronavirussen bij het **RU**nd en het **VA**rken") project funded by the Belgian Federal Public Service for Health, Food Chain Safety and Environment (RF 21/6347).

Where?

The defence will take place on Thursday, 29th October 2026, at 1600h

Auditorium 1 (entrance 24, 3rd floor)

Faculty of Veterinary Medicine
Ghent University, Campus Merelbeke
Salisburylaan 133, 9820 Merelbeke

The public defence will be followed by a reception in the Museum Morphology (entrance 22, ground floor).

How to attend?

If you would like to attend, please register before 22nd October 2026 by email to ruth.mumo@ugent.be

A meeting link will be shared with participants who wish to attend remotely.

Members of the Jury

Prof. dr. Siska Croubels

Chairperson of the Jury
Faculty of Veterinary Medicine, Ghent University

Prof. dr. Jolien Van Cleemput

Secretary of the Jury
Faculty of Veterinary Medicine, Ghent University

Prof. dr. Steven Van Gucht

Infectious Diseases in Humans, Sciensano

Prof. dr. Nigel Temperton

Viral Pseudotype Unit,
University of Greenwich and University of Kent

Prof. dr. Dominiek Maes

Faculty of Veterinary Medicine, Ghent University

Dr. Annelies Stevaert

Rega Institute for Medical Research,
Katholieke Universiteit (KU) Leuven

Summary

Coronaviruses are respiratory and enteric pathogens infecting both animals and humans. They are known for their rapid genetic evolution, which can expand their host range. Human coronaviruses have zoonotic origins, typically originating in bat and rodent reservoirs and transmitting through intermediate animal hosts. Although bovine coronavirus (BCoV), porcine haemagglutinating encephalomyelitis virus (PHEV), and porcine respiratory coronavirus (PRCV) have circulated in livestock for decades, they were long overlooked by the scientific community. The COVID-19 pandemic, however, renewed interest in animal coronaviruses and their zoonotic potential.

First, we investigated the prevalence of all 3 animal coronaviruses by serological investigations of Belgian cattle and swine herds. Serum samples collected between December 2021 and March 2022 were used to conduct a serological cross-sectional survey. The results showed that all 3 coronaviruses are endemic, with individual seroprevalences of 95.3% for BCoV, 96.2% for PHEV, and 76.4% for PRCV. Additionally, PHEV and PRCV are co-circulating in most swine herds. Seroprevalence generally increased with age and was higher in more animal-dense provinces.

Second, we examined the genetic and antigenic diversity of BCoV, PHEV and PRCV isolates circulating in Belgium from 2020 to 2023. They were compared with historical and geographically diverse strains. The gene encoding the major surface protein (spike) evolved at rates comparable to that in SARS-CoV-2, the virus responsible for the COVID-19 pandemic. Unlike with SARS-CoV-2, most mutations in the animal coronaviruses were silent, meaning they did not change the resulting amino acids. This resulted in minimal antigenic changes over time for all 3 animal coronaviruses. However, contemporary European BCoV strains exhibited antigenic divergence from the historical North American Mebus vaccine strain, suggesting potential benefits of updating vaccine strains.

Third, we investigated whether humans possess cross-neutralising antibodies against these animal coronaviruses. For this purpose, we tested human serum samples for neutralising antibodies against 4 endemic human coronaviruses as well as the 3 animal coronaviruses. Cross-neutralisation assays showed high antibody titres against BCoV across all ages (<1 to 96 yrs) that correlated strongly with the endemic human coronavirus OC43 antibody titres. Neutralising antibodies were also detected at lower titres against PHEV. This is in line with the relatedness of these coronaviruses. HCoV-OC43 originated from an ancestral BCoV spillover. It is also related to PHEV. Antibody titres against both BCoV and PHEV were higher in post-COVID-19 pandemic sera than in pre-COVID-19 pandemic sera. This “boosting” may be the result of evolutionarily conserved epitopes in animal and human coronaviruses. No antibodies were detected against PRCV.

In conclusion, while BCoV, PHEV, and PRCV remain endemic in Belgian livestock, their current public health risk appears low. Spillover to humans has never been reported. Should a spillover of BCoV or PHEV occur, the impact would be mitigated in part by cross-neutralising antibodies. These results highlight the need for further research into how cross-reactive antibodies induced by human coronavirus infection or vaccination may modulate the pandemic risk of emerging zoonotic coronaviruses.

Campus Merelbeke

Salisburylaan 133, 9820 Merelbeke



Campus Merelbeke	
22	Museum Morfologie
12	Auditorium A en B
19	Auditorium D
22	Auditorium 1 Maximum
24	Auditorium 1
5	Verloskunde kleine huisdieren <i>Obstetrics small animals</i>
6	Verloskunde grote huisdieren <i>Obstetrics large animals</i>

Campus Merelbeke	
7	Inwendige ziekten paard <i>Internal medicine horse</i>
9	Inwendige ziekten rund <i>Internal medicine ruminants</i>
17	Heelkunde en medische beeldvorming <i>Surgery and medical imaging</i>
20	Kleine huisdieren <i>Small animals</i>
76	Autopsie <i>Autopsy</i>
79	Pluimvee en Bijzondere dieren <i>Poultry and exotic animals</i>

- Fietswegel / Bicycle route
- Fietsenstalling / Bicycle storage
- Resto / Restaurant
- Parking
- Buitenring / Outer ring
- Binnenring / Inner ring