

INVITATION PUBLIC DEFENSE

Molecular determinants of attachment, entry and immunity in porcine viruses: implications for prevention of rotavirus, circovirus and porcine reproductive and respiratory syndrome virus (PRRSV) infections

Xiaolei Ren

Promotor

20th October 2026
17:00h at Campus Merelbeke

Prof. dr. Hans Nauwynck
Faculty of Veterinary Medicine, UGent

Curriculum Vitae

Xiaolei Ren earned a Bachelor of Agriculture from Northwest A&F University in China, 2015. In the same year, he began his master's studies at the Faculty of Veterinary Medicine, China Agricultural University, and completed his thesis in 2018. Before starting his doctoral studies, Xiaolei worked as a Research Officer at Northwest A&F University, where he gained practical experience using molecular techniques to address vaccination issues in household animals. Since January 2020, he has pursued his doctoral studies under the supervision of Prof. dr. Hans Nauwynck at the Laboratory of Virology, Faculty of Veterinary Medicine, Ghent University, Belgium.

Xiaolei Ren is the author or co-author of several scientific publications and has presented his work at multiple international conferences. He has also supervised one master's student.

Where?

The defense will take place on **Tuesday 20 October 2026 at 17:00h**

Auditorium D (Entrance 19)

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

The public defense will be followed by a reception

How to attend?

If you would like to attend, please register before 14 October 2026, by email to Xiaolei.Ren@ugent.be

Members of the Jury

Prof. dr. Eric Cox

Chairman of the Jury
Faculty of Veterinary Medicine, Ghent University

Prof. dr. Lars Erik Larsen

Department of Veterinary and Animal Sciences
University of Copenhagen, Denmark

Prof. dr. ir. Peter Delputte

Department of Biomedical Sciences,
University of Antwerp, Belgium

Prof. dr. Dominiek Maes

Faculty of Veterinary Medicine,
Ghent University

Prof. dr. Jolien Van Cleemput

Secretary of the Jury
Faculty of Veterinary Medicine,
Ghent University

Summary

The modern pig industry faces persistent challenges from viral pathogens that compromise animal health and productivity. Rotavirus A (RVA), porcine circovirus 2 (PCV2), and porcine reproductive and respiratory syndrome virus (PRRSV) are among the most economically significant, causing neonatal diarrhea, post-weaning wasting, and reproductive and respiratory failure, respectively. Each virus relies on specific surface proteins for host cell recognition and entry: the VP8* domain of VP4 for RVA, the capsid protein Cap for PCV2, and the minor glycoprotein complex GP2a/3/4 for PRRSV. Despite vaccination and management efforts, all three viruses remain prevalent, and current vaccines provide only partial protection. This thesis investigates these attachment and entry proteins, with the objective of translating a deeper understanding of virus-host interactions into practical control strategies.

Chapter 1 provides a literature review of the three viruses under investigation, addressing genome and virion structure, genotype diversity, target cells, and the molecular mechanisms of attachment and entry, including relevant receptors and cellular ligands.

Chapter 2 outlines the aims of the thesis.

Chapter 3 characterizes the glycan preferences of circulating porcine RVA strains. Five representative VP8* domains were expressed and tested using hemagglutination, glycan array, and oligosaccharide binding assays, which identified β -lactose as a widely recognized core ligand across diverse genotypes. Pre-incubation with β -lactose reduced infection of MA104 cells and primary piglet enterocytes in a dose-dependent manner, supporting the hypothesis that milk lactose contributes to the protection of suckling piglets and that lactose-containing feed may be beneficial during weaning.

Chapter 4 examines the use of the PCV2 capsid protein as a vaccine antigen. Cap proteins were expressed in *Escherichia coli* and screened in vitro with a panel of monoclonal antibodies, demonstrating that the candidate protein best retains the native antigenic surface. In two vaccination-challenge experiments, the candidate vaccine achieved sterilizing immunity, with viral DNA undetectable throughout the post-challenge period and outperformed a commercial baculovirus-based vaccine.

Chapter 5 investigates the role of individual GP2a residues in PRRSV infectivity. Two highly conserved motifs were identified, and mutation of motif 1 revealed three functional classes of residues, with one residue found to be indispensable. Serial passaging demonstrated distinct evolutionary trajectories, indicating that fitness recovery can proceed through multiple genetic pathways when a structurally constrained position is altered.

Chapter 6 recapitulates and discusses the main findings of the thesis.

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
Obstetrics small animals
- 6 Verloskunde grote huisdieren
Obstetrics large animals

Campus Merelbeke

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

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