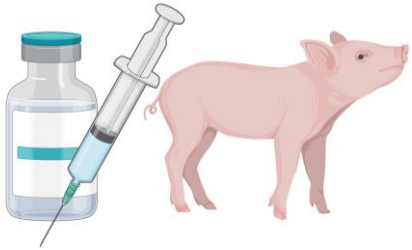
Recent swine flu research at Ghent University, Belgium

Prof. Kristien Van Reeth
Faculty of Veterinary Medicine
Ghent University, Belgium

3 - 4 April 2024

Research topics



- Heterologous prime-boost vaccination for a broader protection against swine and human influenza viruses

FLUZOVA project

- Swine influenza surveillance

EPICVIR project

- Emerging porcine influenza and coronaviruses

nature communications

Article | Open access | Published: 27 November 2023

Sequential vaccinations with divergent H1N1 influenza virus strains induce multi-H1 clade neutralizing antibodies in swine

Kristien Van Reeth, Anna Parys, José Carlos Mancera Gracia, Ivan Trus, Koen Chiers, Philip Meade, Sean Liu, Peter Palese, Florian Krammer & Elien Vandoorn

https://doi.org/10.1038/s41467-023-43339-3

Behind the Paper

An unconventional vaccination strategy against influenza viruses from humans and swine

Influenza is not a single virus, but a collection of subtypes broken down into many different strains. Ordinary flu vaccines can only protect against a small proportion of these. Here, we obtained a surprisingly broad protection by sequential vaccination of pigs with highly diverse "H1N1" strains.

Published Dec 08, 2023

Kristien Van Reeth
Professor, Ghent University

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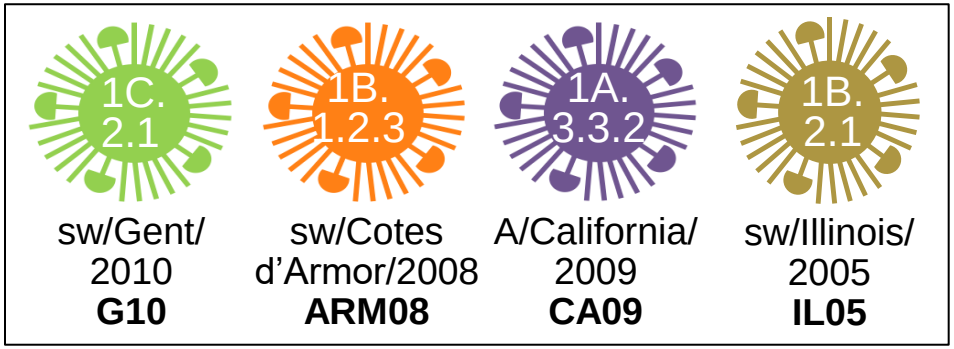
https://communities.springernature.com/posts/an-unconventional-vaccination-strategy-against-influenza-viruses-from-humans-and-swine



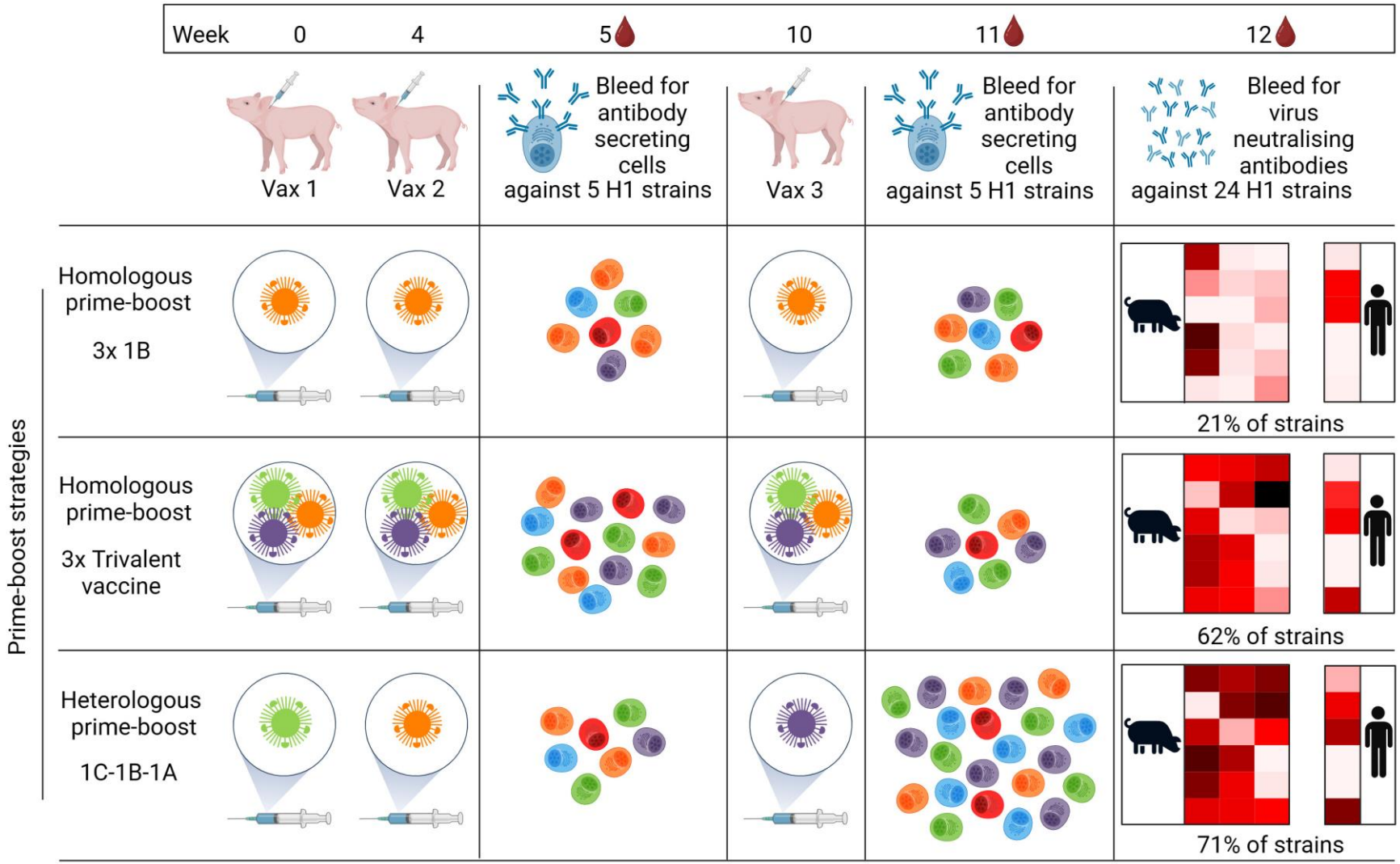
Experimental design

Nature Communications 2023, 14: 7745

Week	0	4	10	8 or 14	+3 days

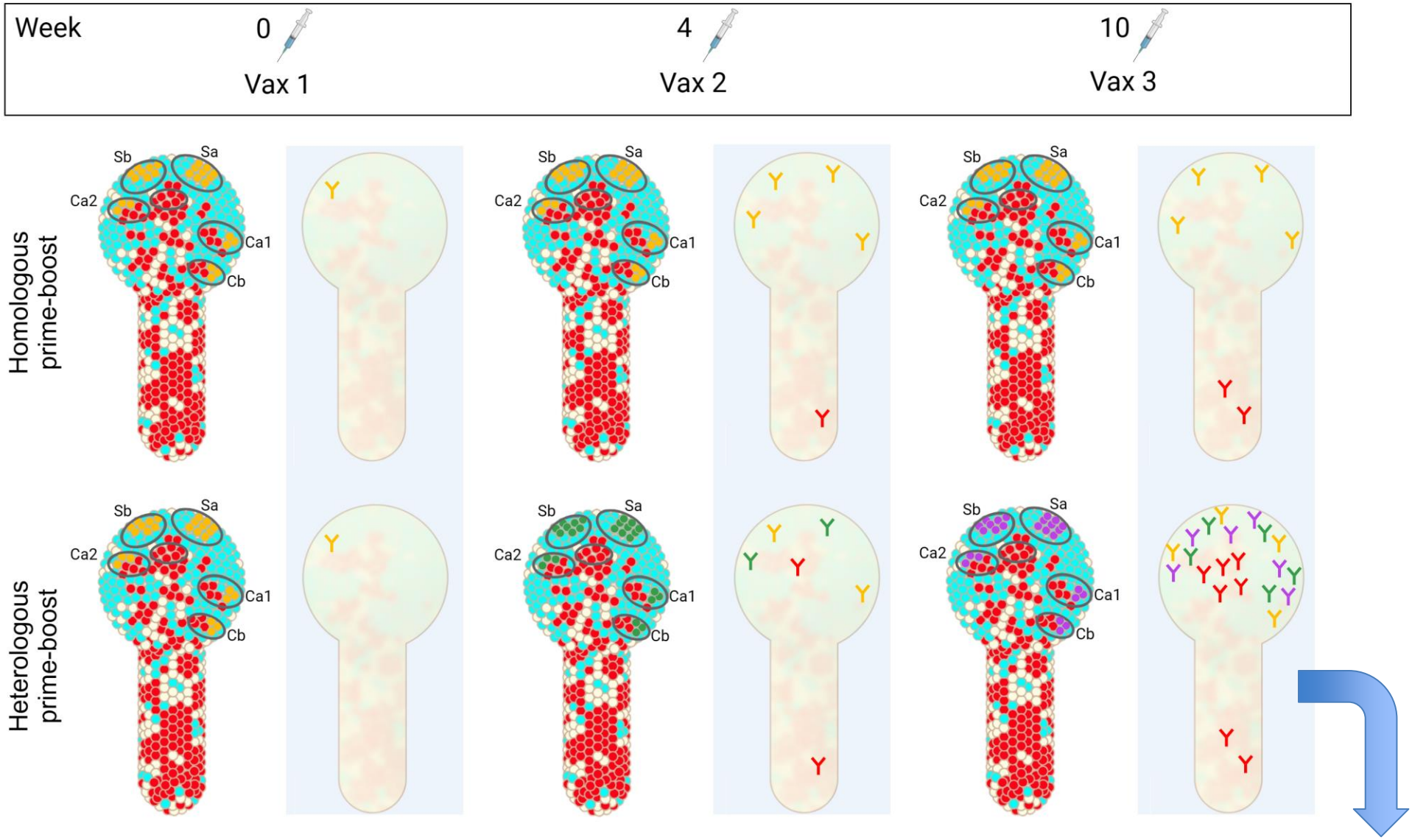
Experiment	Prime-boost strategy	Group	Vaccinations 1	2	3	Challenge	Euthanasia
1 2-dose 2-strain	Control	Untreated (*n* = 4)					✓
		PBS-PBS (*n* = 10)				✓ ✓	✓
	Homologous	CA09-CA09 (*n* = 10)				✓ ✓	✓
		ARM08-ARM08 (*n* = 5)				✓	✓
		IL05-IL05 (*n* = 10)				✓ ✓	✓
		G10-G10 (*n* = 5)				✓	✓
	Heterologous	CA09-G10 (*n* = 5)				✓	✓
		G10-CA09 (*n* = 5)				✓	✓
		CA09-IL05 (*n* = 5)				✓	✓
		ARM08-IL05 (*n* = 5)				✓	✓
		IL05-ARM08 (*n* = 5)				✓	✓
		CA09-ARM08 (*n* = 5)				✓	✓
		G10-IL05 (*n* = 5)					
		G10-ARM08 (*n* = 5)					
2a 2-dose 3-strain	Control	PBS-PBS (*n* = 2)				✓	✓
	Homologous	TIV-TIV (*n* = 7)				✓ ✓	✓
	Heterologous	G10-ARM08+CA09 (*n* = 7)				✓ ✓	✓
2b 3-dose 3-strain	Control	3xPBS (*n* = 4)				✓ ✓	✓
	Homologous	3xARM08 (*n* = 7)				✓ ✓	✓
		3xTIV (*n* = 7)				✓ ✓	✓
	Heterologous	G10-ARM08-CA09 (*n* = 7)				✓ ✓	✓

3-dose, 3-strain: Results



Serology: HI, VN, NI

anti HA-stalk, anti-NP antibodies by ELISA



Working hypothesis: sequential vaccinations with antigenically distinct strains induce antibodies against conserved epitopes in the HA head

FLUZOVA project:

Swine influenza surveillance with emphasis on vaccine strain selection and zoonotic risk

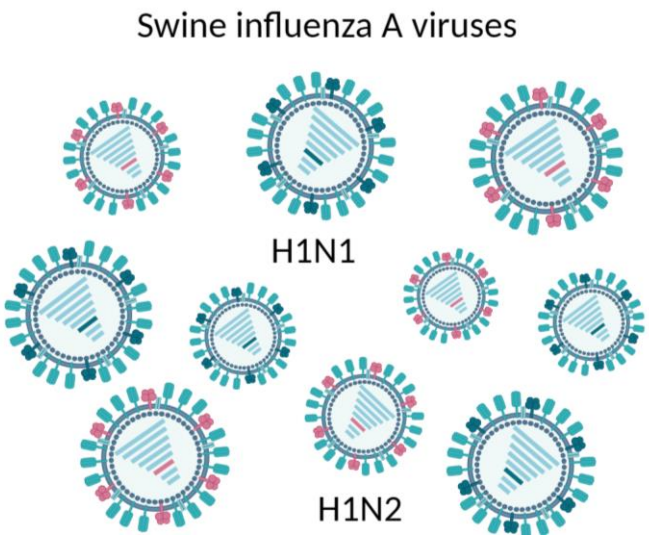
November 2023-2026

Federal Public Service
Health, Food Chain Safety & Environment

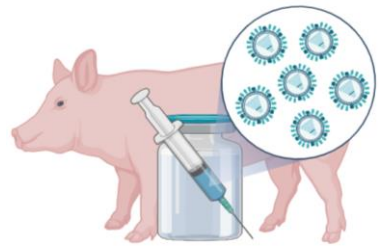
PhD student: Maha Masoudi

Project structure

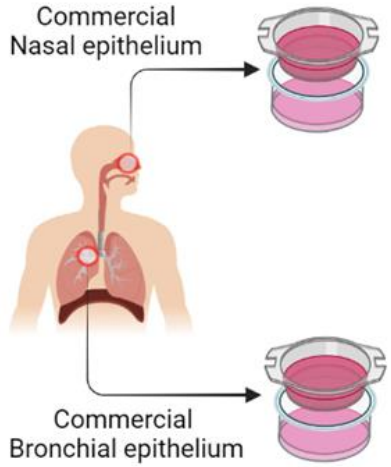
WP. 1, 2 Surveillance and antigenic & genetic characterization

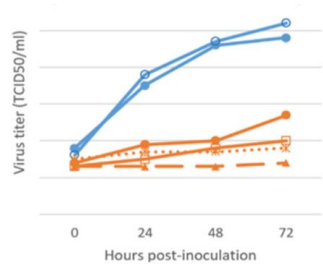


WP. 3 Exploitation of data for swine and human health



Candidate swine IAV vaccine strains





Replication in human and swine airways

Swine influenza A viruses, Belgium, 2023: subtype and genetic constellation

Virus isolate	Subtype	Surface genes		Internal genes					
		HA	NA	PB2	PB1	PA	NP	M	NS
A/sw/Gent/008/2023	H1N2								
A/sw/Gent/013/2023	H1N1								
A/sw/Gent/038/2023	H1N2								
A/sw/Gent/042/2023	H1N2								
A/Sw/Belgium/PS-2197/2023	H1N1								
A/Sw/Gent/086/2023	H1N2								
A/Sw/Gent/095-1/2023	H1N2								
A/Sw/Gent/110/2023	H1N1								
A/Sw/Gent/118/2023	H1N1								
A/Sw/Gent/125/2023	H1N1								
A/Sw/Gent/126/2023	H1N1								

European avian-like H1N1 (1C)

Human-like H3N2 (swG84-like)

2009 pandemic H1N1 (1A)

European human-like H1N2 (1B)

EPICVIR project:

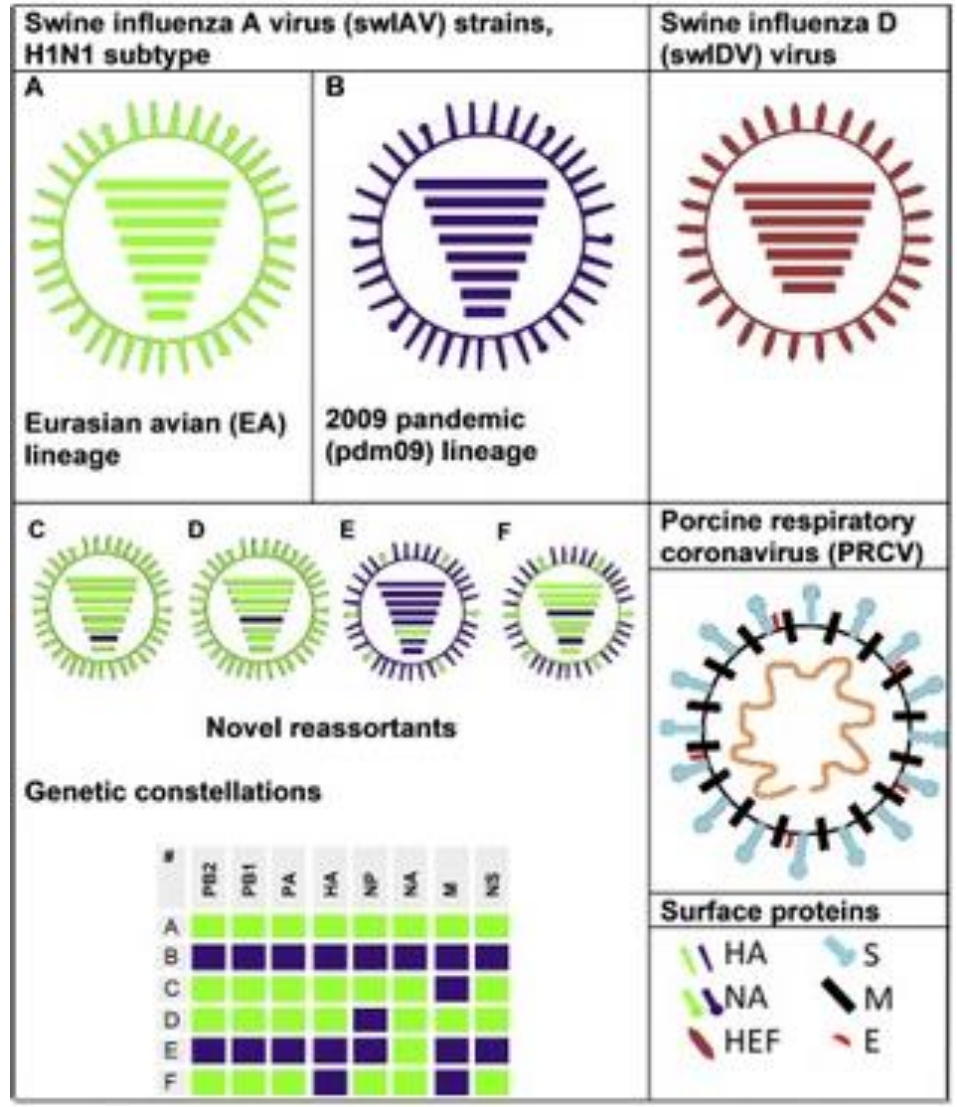
Emerging porcine influenza and coronaviruses

September 2023-2026

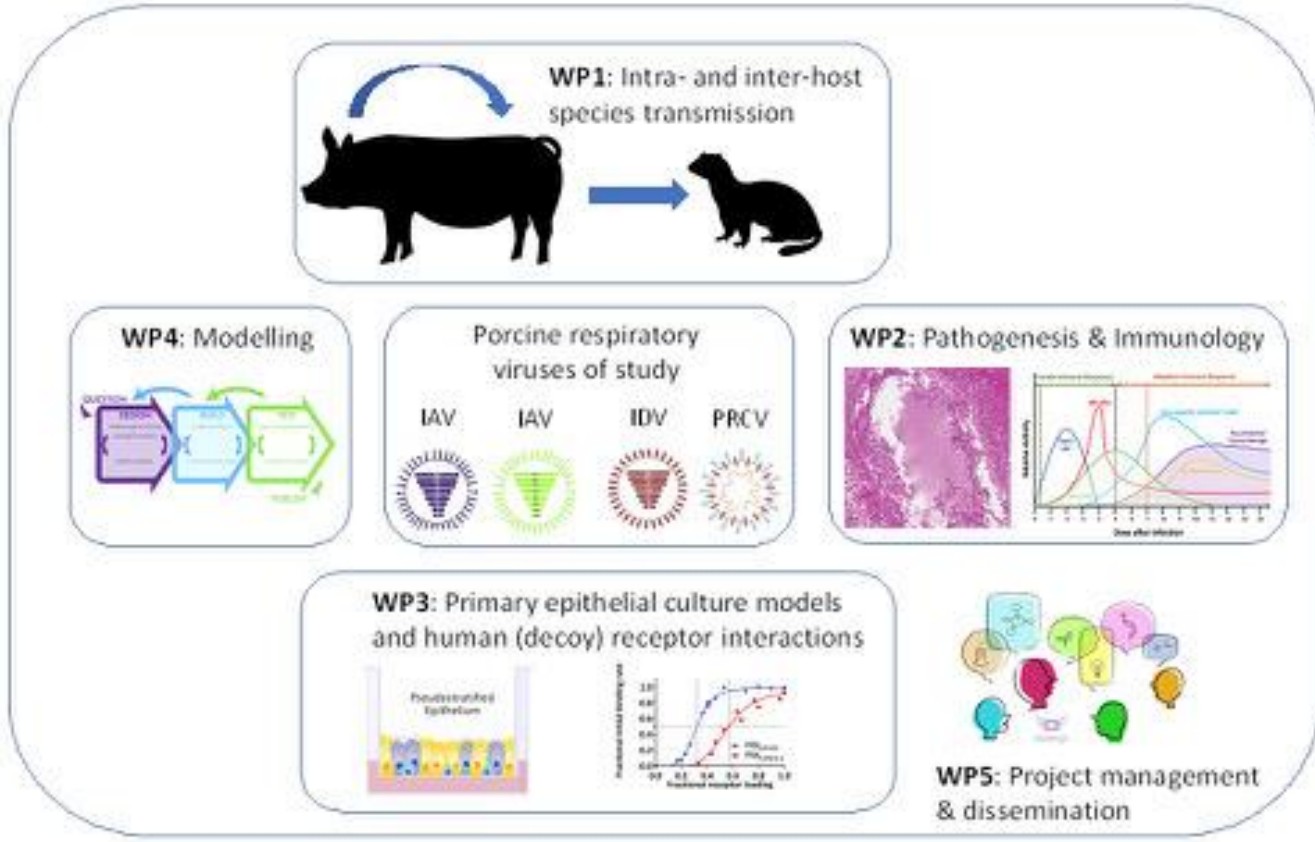
ICRAD: International coordination of research on infectious animal diseases

Ghent University, Utrecht University,
Pirbright Institute, University of Leeds,
Centro Invest. Biol. M. Salas, U Pontificia Comillas

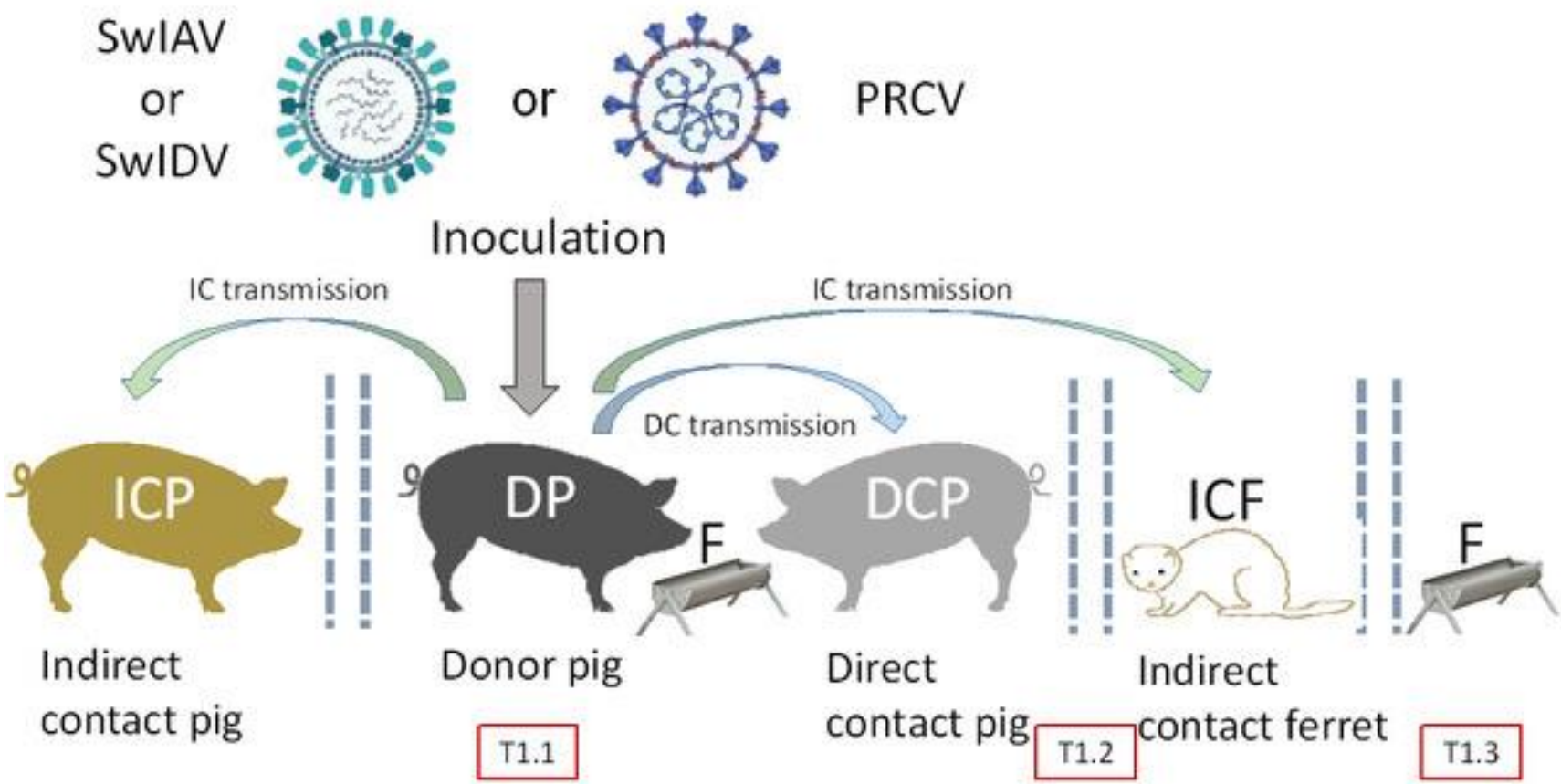
Comparative studies with 8 porcine respiratory viruses



Five workpackages (WP)



WP1: Transmission in pigs and ferrets



UGent, Pirbright

Expected outcome

"A swIV and PRCV rule book which will predict the zoonotic potential, transmission, pathogenicity and immune control mechanisms of existing and emerging swIV and PRCVs"

Thank you