



**STAR
IDAZ**

International
Research
Consortium on
Animal Health

October 29th 2025, Entebbe, Uganda

WOAH Regional Workshop on Vaccination and Alternatives to Antimicrobials

17. Recent innovations in alternatives to antimicrobials and veterinary vaccine technology

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Resolution No 29, adopted during 92nd General Session

'Veterinary vaccines
and vaccination: from
science to action –
reflections for change'



Resolution No.29 adopted by the WOAHA General Assembly.

- Recommendations include :
 - International collaboration on **vaccine research and development**
 - Development of **Target Product Profiles**
 - Facilitate implementation of the **Nagoya protocol**
 - Development and update of **international standards**
 - Assessment of provision for **aquatic animal vaccines**
 - Global alert system on **substandard and falsified** veterinary products
 - Improvement of **forecasting and procurement**
 - **Strategic use of vaccination** to contribute to sustainable disease control
 - Recommendations of support from **WOAHA Reference Centres**
 - Update of priority list for which vaccines could reduce **antimicrobial use**





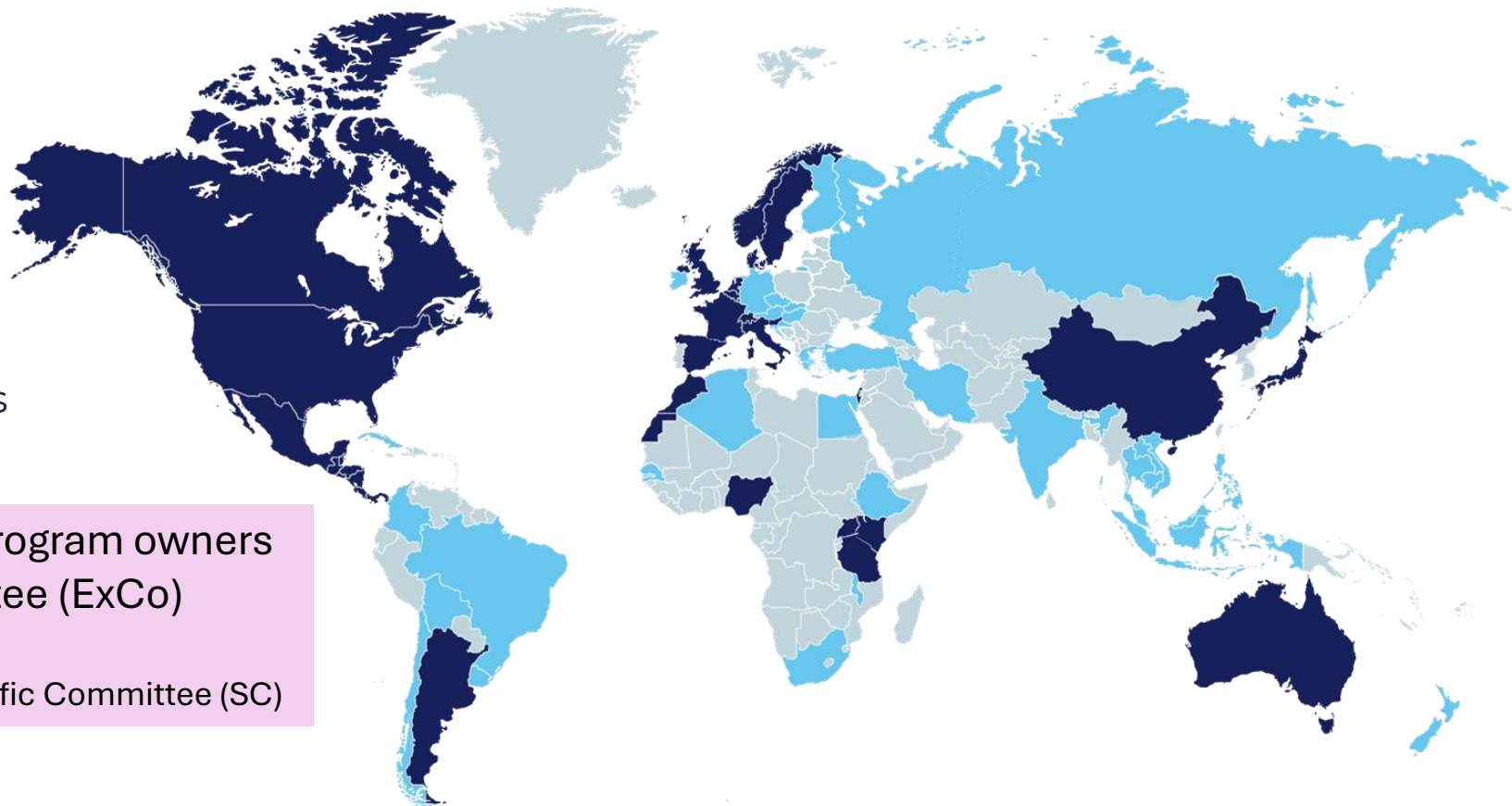
STAR IDAZ IRC, Background

STAR IDAZ

Global **S**trategic **A**lliances for the Coordination of **R**esearch on the Major **I**nfectious **D**iseases of **A**nimals and **Z**oonoses

A network of funders and research program owners who form an Executive Committee (ExCo)

Supported by a Secretariat (SIRCAH) & a Scientific Committee (SC)



36
PARTNER
ORGANISATIONS

23
COUNTRIES

+\$2.5B
RESEARCH
INVESTMENT

4
REGIONAL
NETWORKS

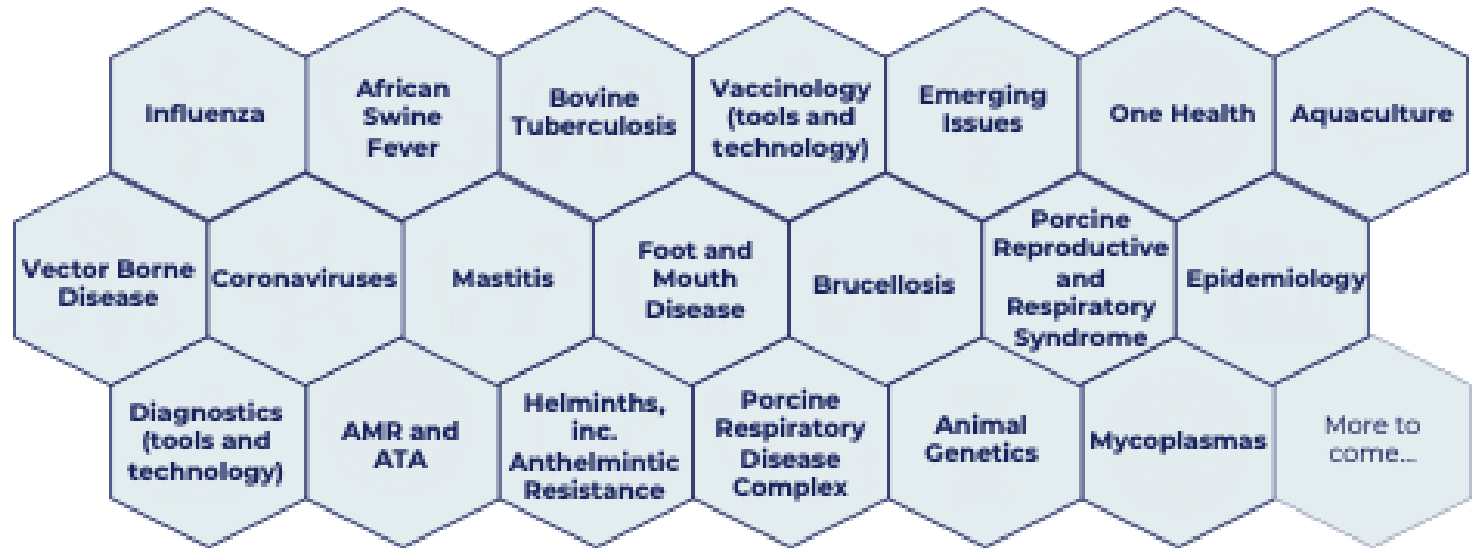
55+
ASSOCIATED
COUNTRIES

Objective and deliverables

The overall objective of STAR-IDAZ IRC is to **coordinate research at international level** to accelerate the delivery of new tools and improved animal health strategies

Deliverables include:

- Candidate vaccines, diagnostics and therapeutics
- Other animal health products and procedures
- Key scientific information/tools to support risk analysis and disease control, e.g., research roadmaps



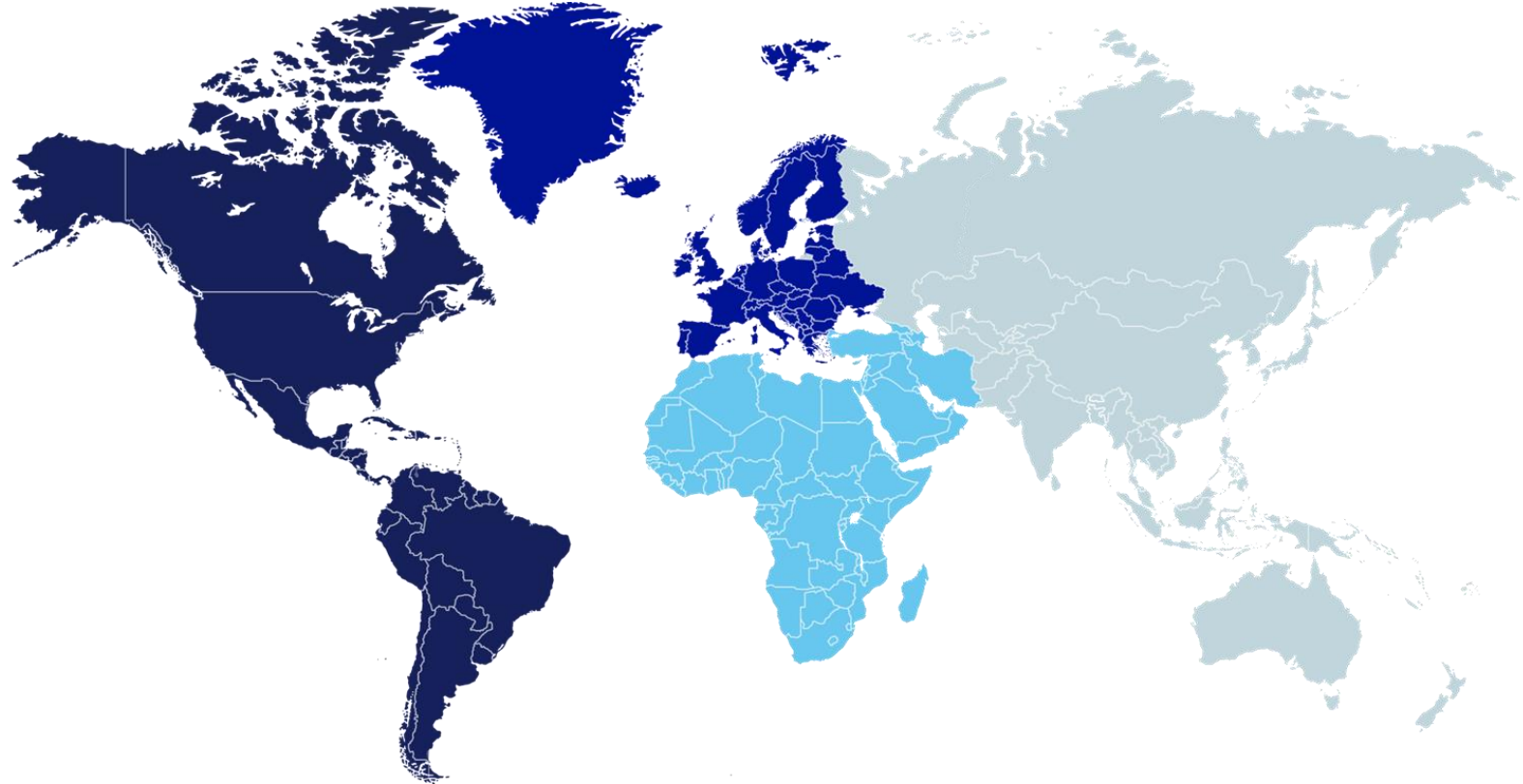
Priority topics as requested by the Executive Committee



Regional Networks

Objectives

- To discuss and agree research priorities for the Region
- To explore the opportunities for sharing resources, including access to samples/strains of organism, specialised facilities and expertise
- To identify international funding opportunities



Americas

Europe

Africa & Middle
East

Asia &
Australasia

Research prioritisation and coordination



Avoid duplication:

Maximize resources by reducing redundant efforts



Improve data sharing:

Encourage sharing of information and better decision making



Foster collaboration

Accelerate faster discoveries



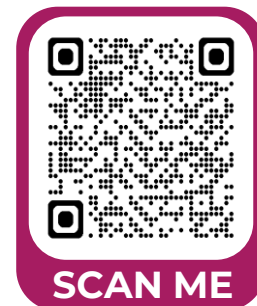
Enhance impact:

Align policy priorities and global health research priorities



Optimise funding:

Support strategic investment in critical areas to drive impactful change



Resources for the Executive Committee and animal health community

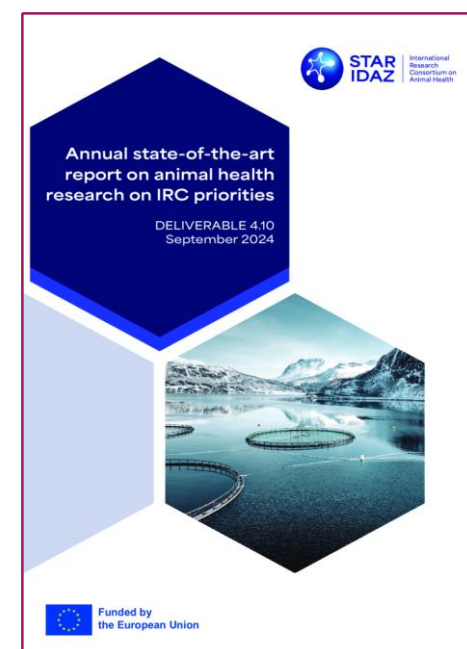
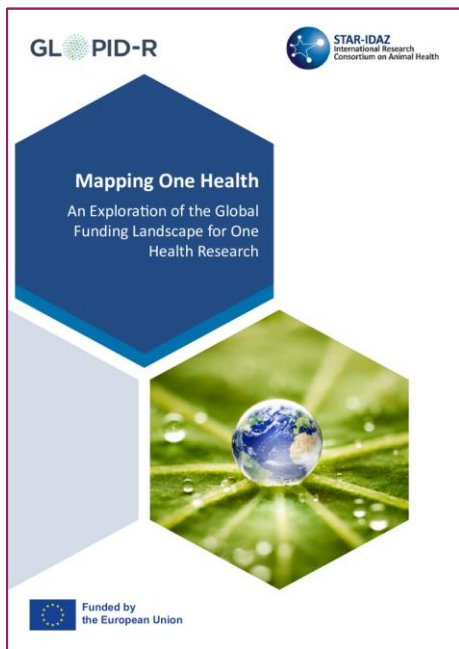
Research reviews

Research roadmaps and
gap analyses

Executive summaries

Workshop reports

State-of-the-art reports



Research Roadmaps: www.star-idaz.net



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DOI: 10.1111/tbed.13821

ORIGINAL ARTICLE

Transboundary and Emerging Diseases | WILEY

Construction of generic roadmaps for the strategic coordination of global research into infectious diseases of animals and zoonoses

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⁵The World Organisation for Animal Health (OIE), Paris, France

⁶United Kingdom Research and Innovation - Biotechnology and Biological Sciences Research Council (UKRI-BBSRC), Swindon, UK

⁷Centre for Agriculture and Bioscience International (CABI), Wallingford, UK

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Funding information

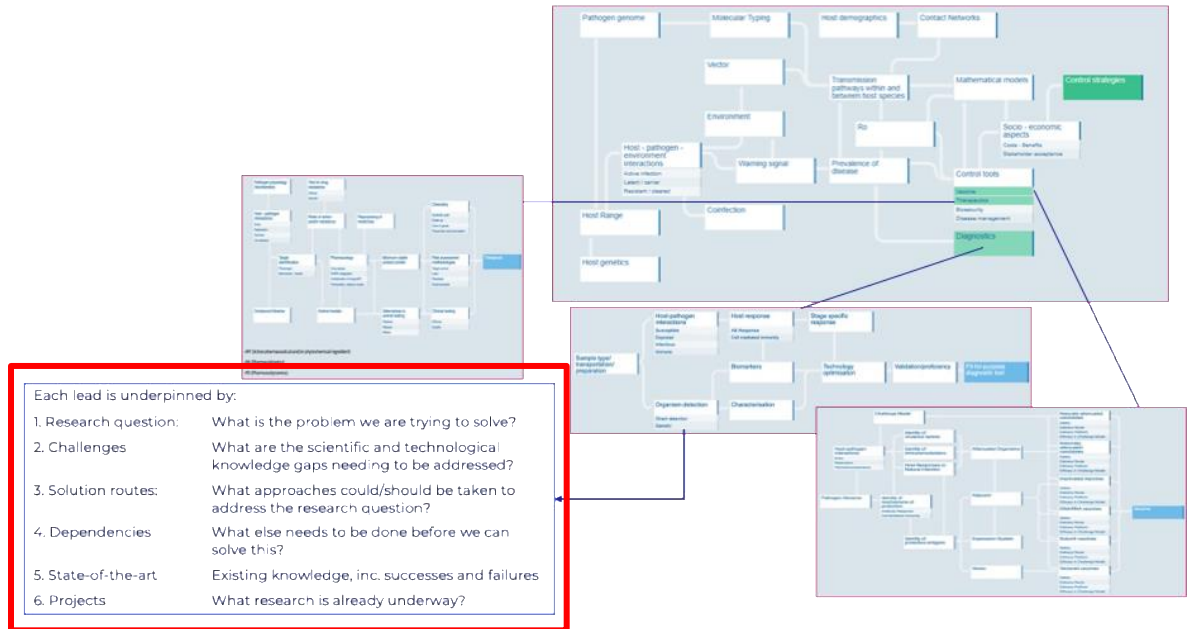
European Union Horizon 2020 Research and Innovation Programme, Grant/Award Number: 727494

Abstract

The Strategic Alliance for Research into Infectious Diseases of Animals and Zoonoses (STAR-IDAZ) International Research Consortium (IRC) coordinates global animal health research to accelerate delivery of disease control tools and strategies. With this vision, STAR-IDAZ IRC has constructed four generic research roadmaps for the development of candidate vaccines, diagnostic tests, therapeutics and control strategies for animal diseases. **The roadmaps for vaccines, diagnostic tests and therapeutics lead towards a desired target product profile (TPP).** These interactive roadmaps describe the building blocks and for each the key research questions, dependencies, challenges and possible solution routes to identify the basic research needed for translation to the TPP. The control strategies roadmap encompasses the vaccine, diagnostic tests, and therapeutic roadmaps within a wider framework focusing on the inter-dependence of multiple tools and knowledge to control diseases for the benefit of animal and human health. The roadmaps are now being completed for specific diseases and complemented by state-of-the-art information on relevant projects and publications to ensure that the necessary research gaps are addressed for selected priority diseases.

KEYWORDS

animal health, diagnostics, epidemiology, roadmaps, therapeutics, vaccines



- Provides a structure and focus on where research is most needed, identifying bottlenecks and critical gaps
- Interactive, 'living' tool publicly available online at www.star-idaz.net



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Animal Health

For more information on STAR IDAZ IRC, how to become an IRC partner or join the regional networks:

 www.star-idaz.net

 www.linkedin.com/company/star-idaz-irc/

 [Twitter.com/StarIdaz](https://twitter.com/StarIdaz)

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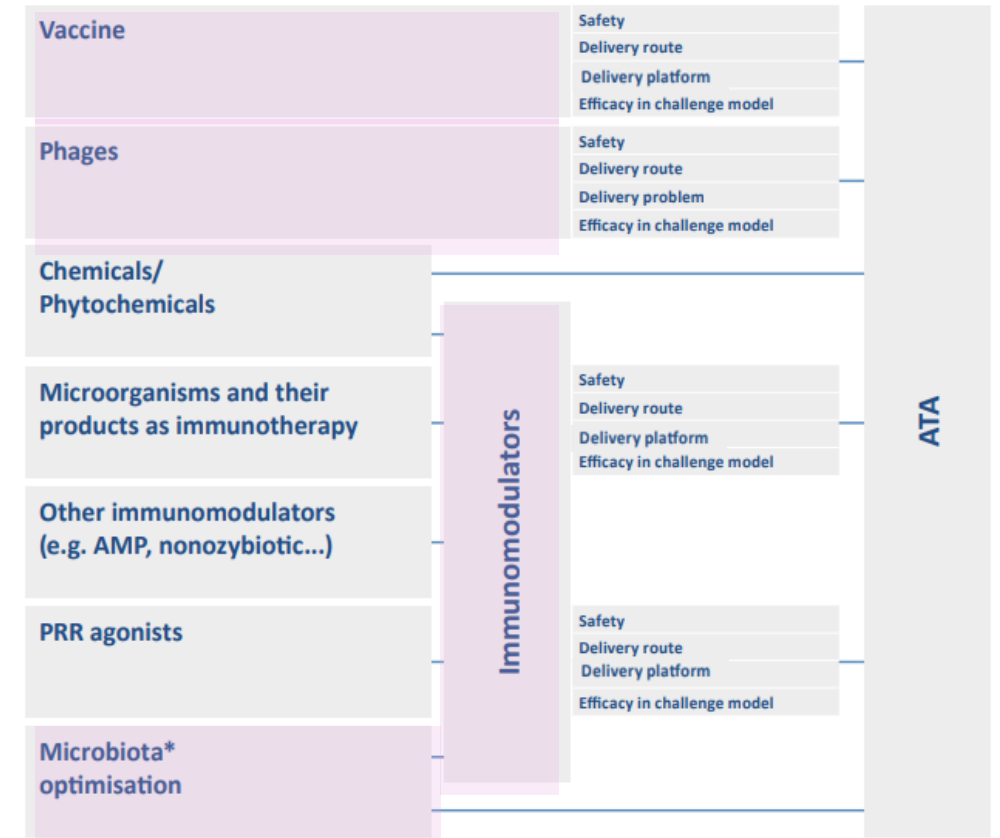
Innovations in alternatives to antimicrobials

AMR & Alternatives to Antibiotics (ATA)

The development of ATA is recognized an important component in the fight against antimicrobial resistance (AMR) for the benefit of both human and animal health

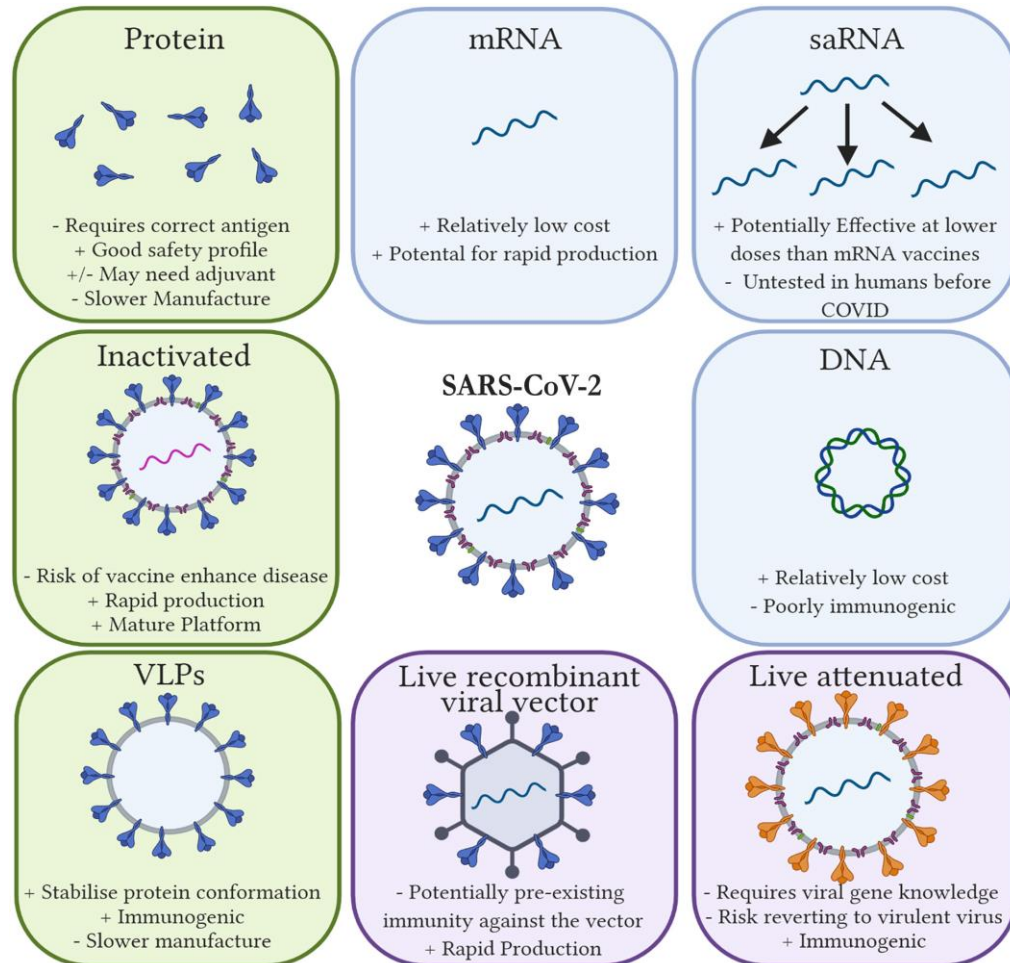
Two publications on website:

- Summary of gap analysis
- Highlight research priorities and gaps
- Roadmaps for phage, immunomodulators and manipulation of the microbiome



Innovations in veterinary vaccine technology

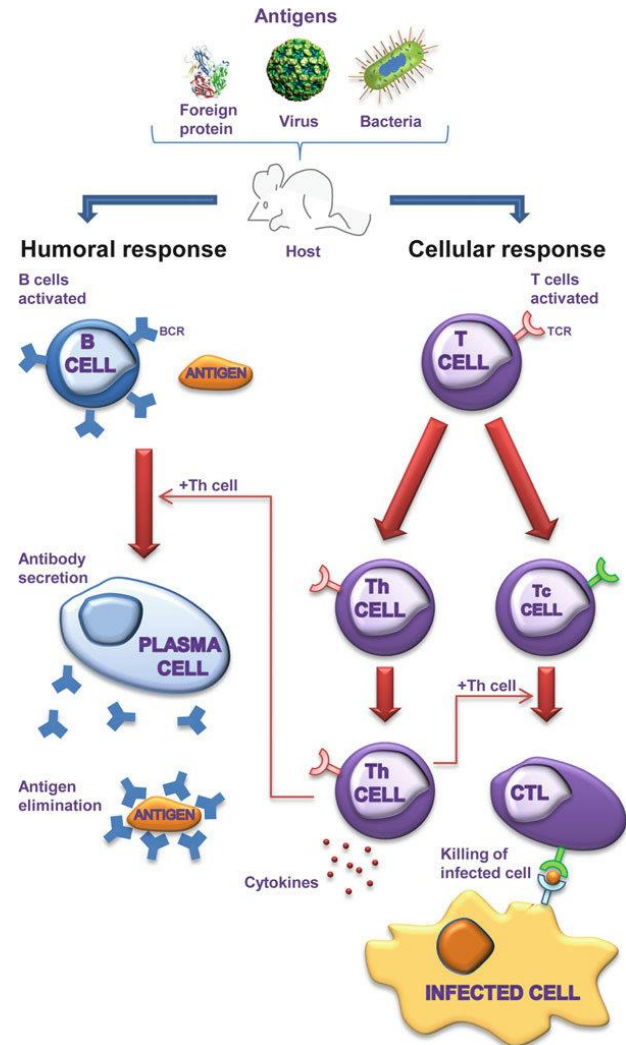
The COVID-19 pandemic spurred investment in vaccine technologies (and rapid response)



Many COVID-19 vaccines were based on the spike “S” antigen, yet they performed differently – why?

Usually associated with quality and/or duration of protective immune responses – need tools and methods to map these

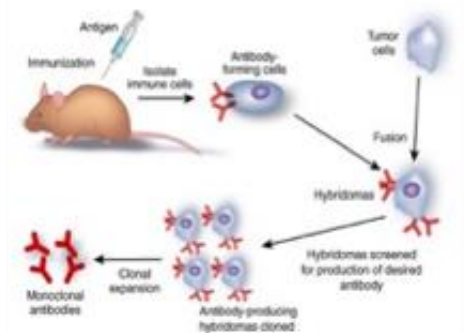
Role of acquired immune responses in vaccine R&D



- Rule of thumb:
 - Antibody responses function on “extra-cellular” pathogens
 - Cell mediated immune responses function on “intra-cellular” pathogens (Th and CTL)
 - Often both will play a role in mediating immunity to disease
- Most vaccine studies focus on antibody responses
 - Some look at Th responses
 - CTL is often not assessed, as this is technically difficult
- Antigen and epitope-specificity is determined by BCR and TCR expressed on B and T cells

Multiple approaches for antibody epitope discovery

Mouse hybridoma technology

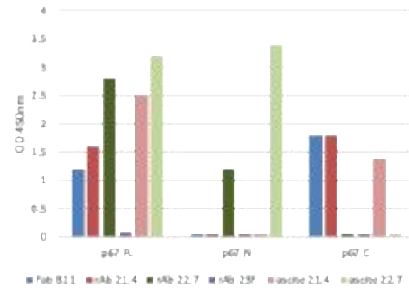


Milstein & Kohler, 1975

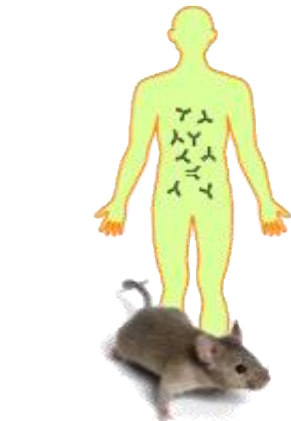
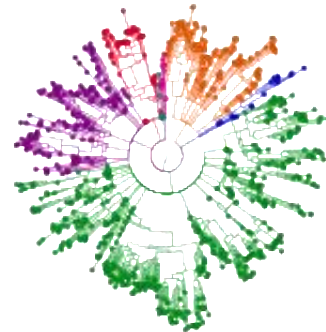


Use any animal

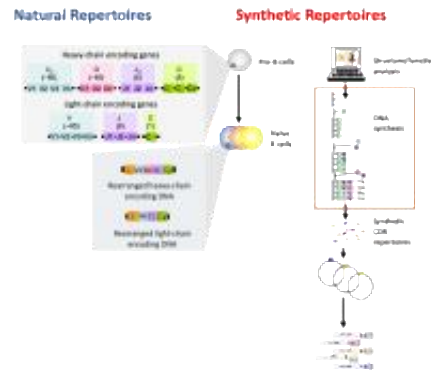
Sequence Ab genes and express as recombinant Abs



Immune repertoire profiling

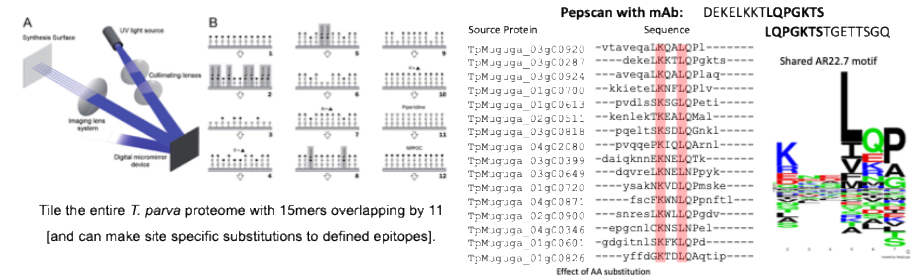


"Humanized" mouse



Synthetic antibodies

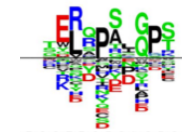
High-density peptide chips to & linear antibody epitopes



Tile the entire *T. parva* proteome with 15mers overlapping by 11 [and can make site specific substitutions to defined epitopes].

ILRI

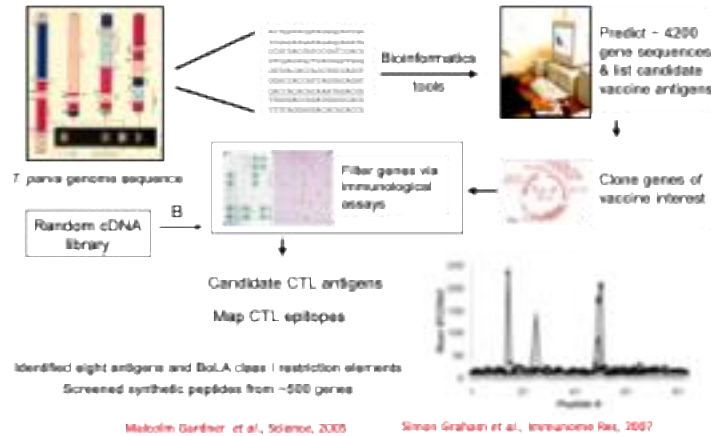
Soren Buus, University of Copenhagen, unpublished



Mapping conformational epitopes is complex and requires structural data

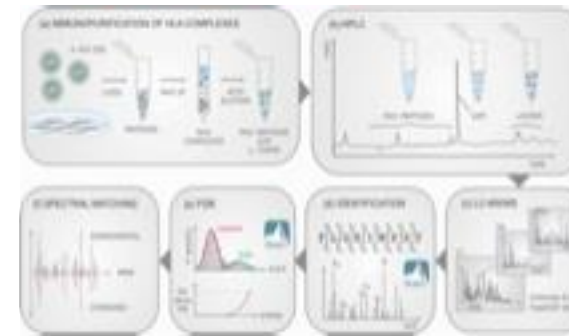
Multiple approaches for Th and CTL epitope discovery

Flowchart of antigen discovery



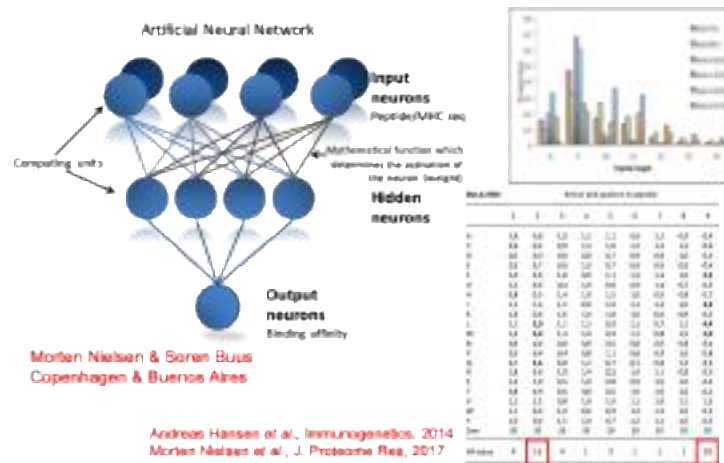
Proteomics of BoLA class-I associated peptides

Nicola Termetta, Target Discovery Institute Mass Spectrometry Laboratory, U. of Oxford
Tim Connolly, The Roslin Institute, U. of Edinburgh



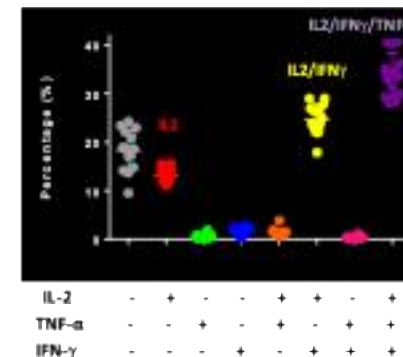
Thirty new antigens – need to be validated

NetMHCpan, an artificial neural network



Antigen-specific poly-functional CD8 T cells

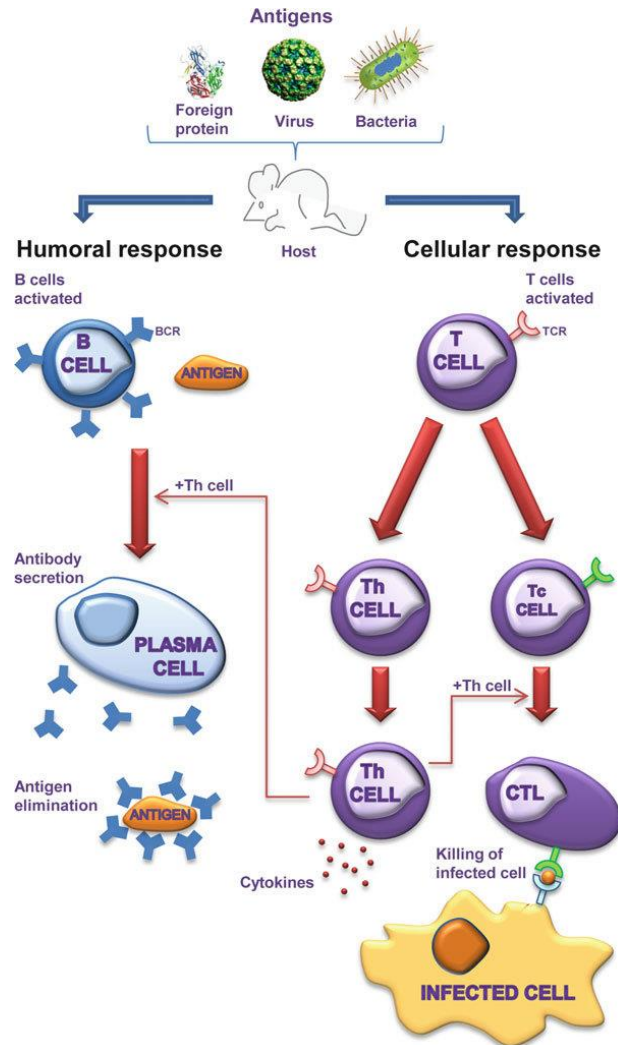
Percentage of the Tp1-specific CD8 T-cells



Can assay in context of 16 different BoLA class I alleles

Lucilla Steinza & Nick Switek

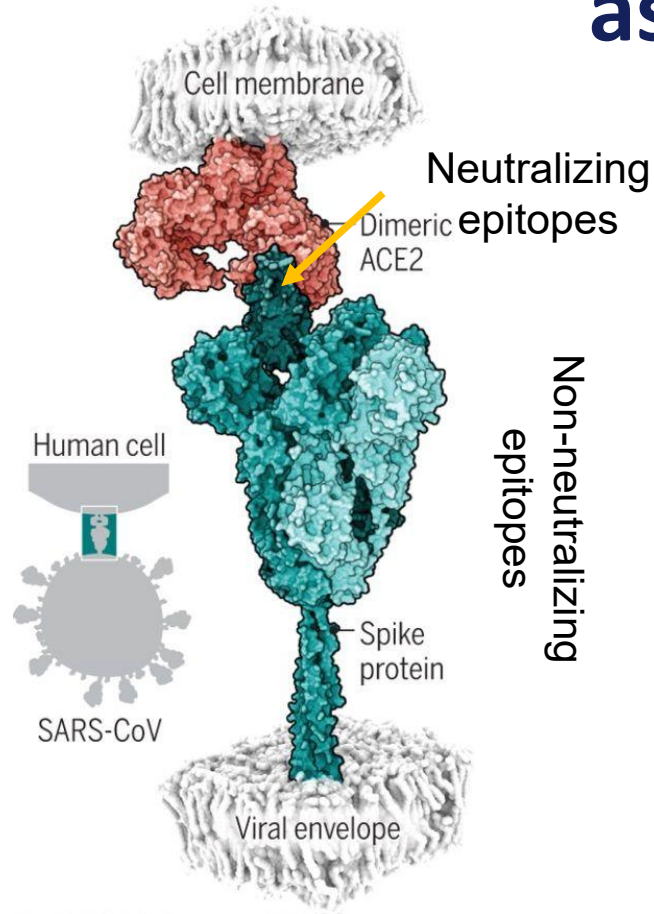
Role of acquired immune responses in vaccine R&D



- *In vitro* assays that correlate with immunity:
 - Prevent infection of cells
 - Kill infected cells
- Shift from antigen to epitope-specific responses
- Trend to epitope focused-vaccine R&D
 - What are these?



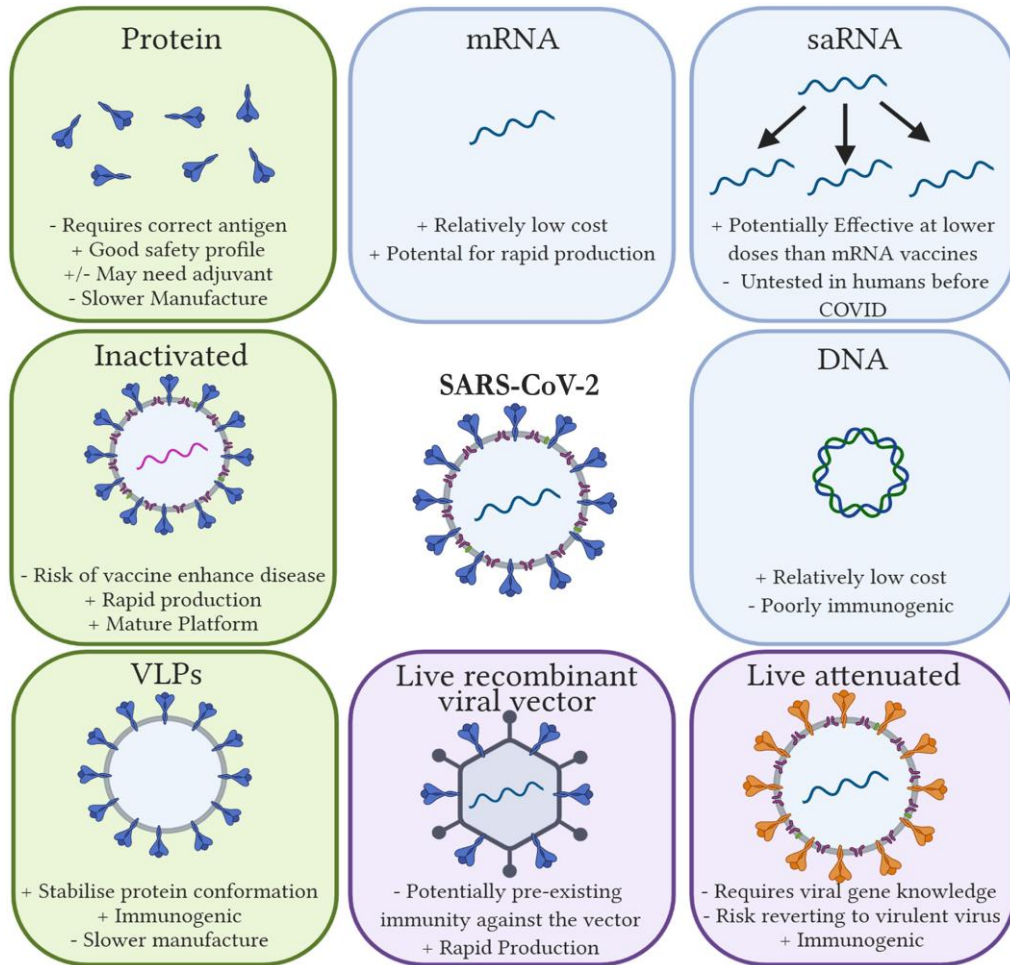
Antigens contain many epitopes, only some are associated with immunity



Spike protein contains many epitopes

- Antibodies directed to many epitopes on an antigen
- Some antibodies prevent virus entry (neutralizing Abs)
- Quality of antibody responses induced by a vaccine is critical as neutralizing and non-neutralizing Abs are induced
- Focus vaccine response to protective (neutralizing) epitopes
 - Some epitopes (B- and T-cell level) could exacerbate disease
- Knowing the structure of antigens and functional significance of epitopes can help design better vaccines

Impact of platform technology on veterinary vaccines



Examples of vet vaccines with all these platforms, but most are inactivated or live attenuated

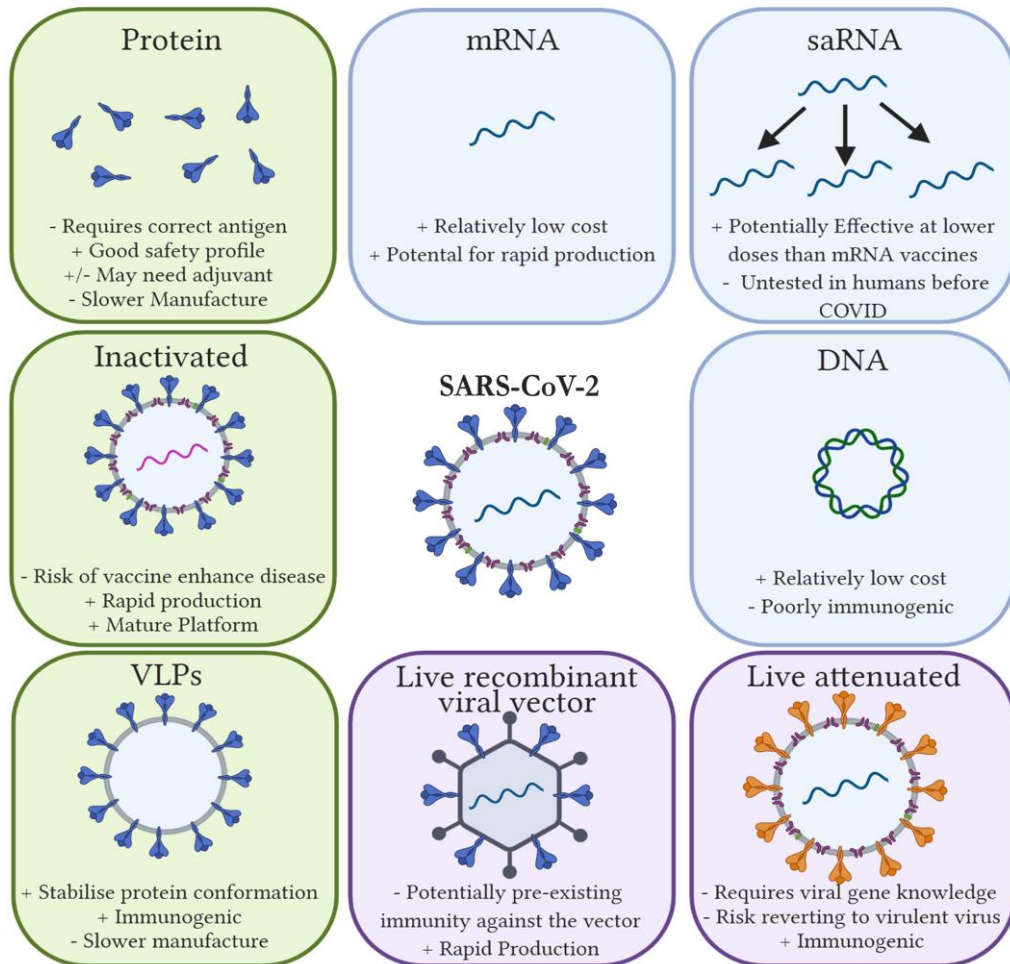
Many platforms require adjuvants or perform better; innovations with molecular adjuvants

Antibody responses via VLPs tend to be better than soluble antigen

Best CTL responses via nucleic acid delivery

mRNA is a highly versatile R&D and vaccine delivery platform

Impact of platform technology on veterinary vaccines



New generation “designer” livestock vaccines requires candidate vaccine antigens

R&D with a target product profile in mind

Forward and reverse methods to identify candidate vaccine antigens in vaccinology

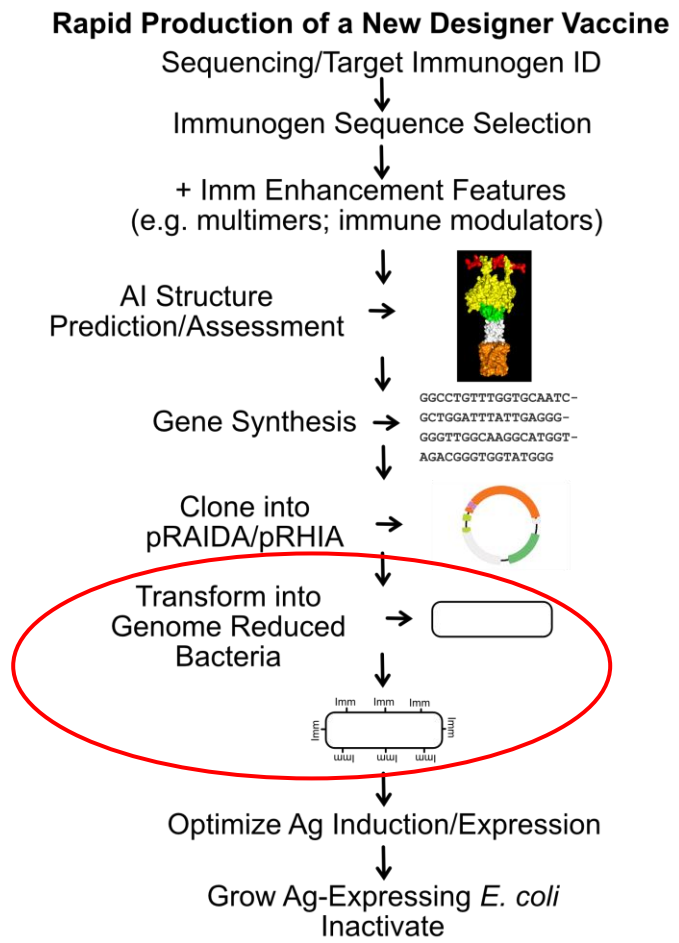
Driven by functional immuno-assays, especially for combination vaccines and meeting the “3Rs”

Immunotherapy vaccines - immunity via passive transfer of antibody

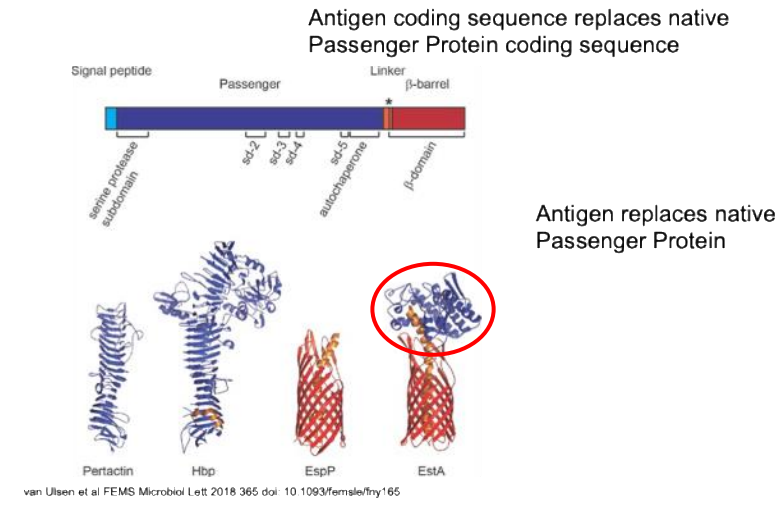
- Could antibody banks support vaccine banks?

A novel killed whole cell surface-expressed bacterial platform

Steven Zeichner

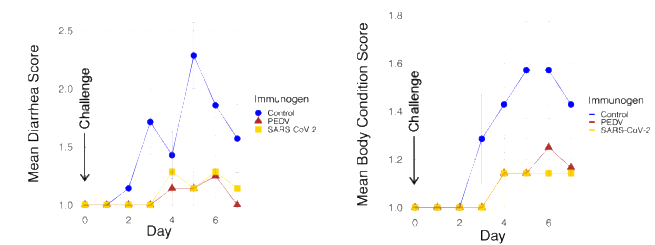


3 weeks



Pig Clinical Responses – Clinical Proof of Principle

Either the SARS-CoV-2 FP vaccine OR the PEDV FP vaccine protect the pigs against clinical disease. The vaccines are cross-protective, indicating the possibility of a universal coronavirus vaccine.



After challenge, pigs were monitored daily for clinical symptom of PEDV infection. About two days post-challenge (dpc), pigs in control group showed clinical symptom. In total, 6 pigs in control group showed symptom of PEDV infection. In two vaccine groups, only 1-2 pigs showed symptom. Significant difference between vaccinated and control groups after 2 dpc.

- Body condition scores (1-3). 1, undetectable spinous processes and hook bones. 2, spinous processes and hook bones were slightly felt. 3, spinous processes and hook bones were easily felt and visible.
- Diarrhea scores (1-3). 1, normal to pasty feces. 2, semi-liquid diarrhea with some solid content. 3, liquid diarrhea with no solid content.



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Global Veterinary Vaccinology Research and Innovation Landscape Survey Report

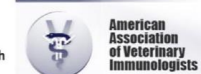
January 2022



The Secretariat for the STAR-IDAZ IRC (SIRCAH) is funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727494

Published April 2022.

Further information contact: Dr Madeleine Clark, BBSRC UKRI Madeleine.Clark@bbsrc.ukri.org



SCAN

Key conclusions:

- Sustainable and open access to immunological tools and associated databases.
- Partnership with industry, is key
- Developing and validating:
 - new immunological methods and technologies that enable research in the natural host and/or the best model species
 - in vitro tools combined with bioinformatics for testing vaccine antigen efficacy and selection
 - models to reduce, replace and refine the use of animals in research (3Rs)
 - knockout models to decipher different types of immune response
- Discovering and validating adjuvants that generate an optimal immune response in veterinary species (58% very important).
- Incorporation of in silico tools including bioinformatics with wet lab to assist in the development of tools for veterinary vaccine research



The antibody hub at The Pirbright Institute



New tools have given us the opportunity to utilise these detailed antibody responses to make the next generation of vaccines and therapies.
Prof. John Hammond



This highly collaborative work will address the needs of the livestock research community whilst bridging the requirements of the vaccine industry. A number of [work programmes](#) will focus on studying B cells and antibodies at multiple scales including gene expression, single cell function and the entire antibody response.

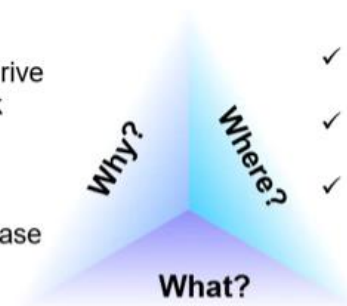
Control livestock infectious diseases in LMIC

- ✓ Act as a central resource to drive antibody research in livestock
- ✓ Secure our food supply
- ✓ Improve animal health and ultimately human health
- ✓ Refine models of human disease to test vaccines

The Pirbright Institute

- ✓ Leader in the study of livestock antibody responses
- ✓ Highly collaborative centre of livestock immune research
- ✓ Facilities that enable the study of high-consequence pathogens in their natural livestock hosts

Cattle, pig, sheep, goat and chicken



Antibody discovery, manipulation and testing in livestock

- ✓ B-cell subset and antigen specific isolation protocols
- ✓ Single B-cell antibody sequencing and characterisation
- ✓ Engineering of antibodies with alternative functions
- ✓ Predict and measure *in vivo* antibody function
- ✓ Antibody repertoire analysis
- ✓ Open access to methods and analysis platforms
- ✓ Enable rational vaccine design



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Centre for Veterinary Vaccine Innovation and Manufacturing (CVIM)

Accelerating the development and deployment of vaccines for neglected and emerging livestock and zoonotic diseases.

[Home](#) > [Centre for Veterinary Vaccine Innovation and Manufacturing \(CVIM\)](#)

The Centre for Veterinary Vaccine Innovation and Manufacturing (CVIM) will support the development and deployment of vaccine technologies to combat neglected and emerging diseases of livestock, including zoonotic diseases that represent a threat to public health.



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IVVN veterinary vaccinology landscape workshop



International
Veterinary Vaccinology
Network



IVVN Landscape Workshop: Shaping the Future of Veterinary Vaccinology

The IVVN Landscape Workshop (3–4 September 2025) brought together global stakeholders in veterinary vaccinology to discuss key challenges and priorities for the field. Over two days of facilitated discussions, participants developed action plans to strengthen research, innovation, and collaboration across the community.

18 Sep 2025

<https://www.intvetvaccnet.co.uk>



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**Thank you for
your attention**