International
Veterinary Vaccinology
Network

# Annual Report 2021

UKRI Medical Research Council

UKRI Biotechnology and Biological Sciences Research Council

GCRF

International
Veterinary Vaccinology
Network

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# Contents

# Foreword from the IVVN team

As was the case for 2020, Covid-19 has largely dominated this year for us all. But 2021 has also been characterised by efforts to overcome the challenges of the pandemic in new ways.

After the disappointment of being unable to host our conference last year, much of our work this year has centred around our online events programme (page 10). Since September last year, we have hosted five scientific webinars delivered by leading scientists, four half-day symposia covering host-specific vaccine development efforts, an International Women's Day webinar co-hosted with African Women in Agricultural Research and Development (AWARD), an online workshop as part of an IVVN-funded pump-priming project, and initiated a series of seven online courses for early career researchers. And while none of these online events come close to the pleasure of welcoming our members to in-person conferences and workshops, we have enjoyed seeing our community come together and engage in these new activities.

In August, we launched a new report, jointly published with the British Society for Immunology, calling for urgent strategic investment in veterinary vaccinology. As we developed the report, it was a pleasure to reflect on the impact research and development of veterinary vaccines has had both in the UK and globally. You can read about the report and the motivation behind it on page 20.

With some restrictions easing this year, we have also been able to resume our African Schools Outreach Programme (ASOP). The ASOP team have held workshops in Kenya and Nigeria this year, and it has been a joy to see the success of the programme after months of being unable to host activities. Since our last annual report, the ASOP team have also been shortlisted for the 2020 Nature Research science outreach award. This is a true testament to the community-driven success of the programme – congratulations to the whole team! Coverage of this year's ASOP activities start on page 23.

Also this year, work began on the first six projects funded through our Fellowship programme (page 28), jointly funded with our partners at the International Development Research Centre (IDRC). We held a meeting of all the Fellows earlier this year, and we will be eagerly following their progress as the projects continue.

We are continuing our work on new initiatives that we hope will benefit you as members. Work is continuing on establishing a new database of veterinary vaccinology information. We hope that this resource will integrate a wealth of diverse data to support our members, including listing pathogen-specific expertise, making it easier to find out about current research activities, and also listing information on industrial and academic partners.

We are also working to improve our members directory. All IVVN members have a profile on our directory. This profile is where you can tell other members and visitors who you are, what you're working on and where, and what your expertise is within veterinary vaccinology. To make the directory work for everyone, we need your help. Please ensure that your profile is up to date, contains all the required information, and contains a picture.

As ever, if you have any suggestions on how we can improve the Network, then please get in touch with the IVVN team at IVVN@roslin.ed.ac.uk.

Stay safe and stay well

Tim, Bryan, Carly, Mabon and Anne

# Background

Livestock agriculture is a crucial component of the economy in many low- and middle-income countries (LMICs), providing income to approximately 60% of rural households and supporting the livelihoods of around 1.7 billion people. As a source of high-value and nutrient-dense products, livestock agriculture also plays a major role in sustaining global food security and combatting malnutrition. Estimates of population growth combined with rising income indicate that demand for livestock and livestock products such as meat and dairy will increase by around 150% between now and 2050, with much of that increase being driven by demand from LMICs. In addition, changes in global supply chains indicate that between now and 2050 there will be a transition, with LMICs becoming the major exporters of livestock and livestock products. Meeting this demand through increasing production provides a clear route to both alleviating the poverty of rural farming populations and also contributing to the economic development of LMICs. However, realising this potential will necessitate modifications to agricultural practices with a greater dependency on higher intensity farming techniques and also enhanced biosecurity and health standards to meet the requirements for international trade. Vaccines remain the most effective means of combatting the numerous diseases that can detrimentally affect the health, welfare and productivity of livestock and so will have a crucial role in promoting enhanced livestock farming practices in LMICs.

However, for many diseases that are prevalent in LMICs, efficacious vaccines are either yet to be developed or are not reliably available to the farmers that require them. The successful development and deployment of a vaccine is a complex process, dependent on the effective integration of skills and resources from a range of basic and applied scientific disciplines including, but not limited to, epidemiology, immunology, bacteriology, virology, parasitology, structural biology, industrial biochemistry, logistics, and socio-economics. Overcoming the technical obstacles that can hinder the generation of novel vaccines often requires input from multiple specialists with complementary expertise. For many veterinary diseases of particular relevance to LMICs, the opportunities to establish these collaborations can be limited.

The International Veterinary Vaccinology Network (IVVN) was established in 2017 with a £2.1m grant from the Global Challenges Research Fund (GCRF) of the UK government. The aim of the Network was to establish a 'broad, inclusive and accessible community' that would enable 'the integration of inputs from research scientists, industrial partners and others to focus specifically on development of vaccines for high-consequence livestock (including poultry and aquaculture) disease in LMICs.' To meet this aim, the IVVN focused on (i) facilitating effective networking among the veterinary (and human) vaccinology communities, to identify groups that could establish novel collaborations to address critical 'bottlenecks' in the development of veterinary vaccines for LMIC-priority diseases, and (ii) providing catalyst funding to support collaborative projects that had the potential to provide scientific solutions to identified 'bottlenecks' and/or enable transfer of essential knowledge and skills between IVVN members. A priority of the IVVN was to promote active engagement between scientists from the UK and LMICs, and this was integral to all IVVN-funded activities. Since its inception the IVVN has established a large and open community, with over 1,500 members from 93 countries, has organised two international conferences, multiple workshops, supported 13 pump-priming projects, 13 laboratory exchanges and through its website, social media and monthly newsletters provided a previously absent focal point for the global veterinary vaccinology community. During its existence, the IVVN has responded to feedback from its members and, by attracting extra funding, provided additional activities to support the veterinary vaccine research community – including training courses, fellowships for women in LMICs and a schools outreach programme to inspire the next generation of scientists. As we approach the end of the first funding period for the IVVN, we are seeking to expand our activities to serve this important role.

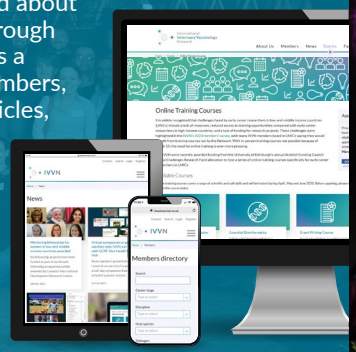
# IVVN activities

The IVVN's activities are centred around four key work areas: **facilitation of networking** between members, **supporting scientific collaboration**, **training early career researchers**, and **promoting gender balance** in veterinary vaccinology research.

## Facilitation

We seek to bring our large but widely dispersed community together in different ways, both in person and online. Our flagship event is our conference, which is attended by hundreds from around the world and live-streamed online. We also host workshops, which cover a specific topic related to the Network's remit, allowing a focused exchange of ideas and plans. Responding to the Covid-19 pandemic, we have moved our events online, and our webinars, symposia and online workshops have been well-attended by members globally. You can read more about these online events starting on page 10.

Members are kept informed about the Network's activities through our website, which includes a searchable directory of members, a blog with contributed articles, event and opportunity listings, and news about our activities. Members also receive a monthly newsletter, and we use our Twitter and LinkedIn pages to update members and non-members alike.

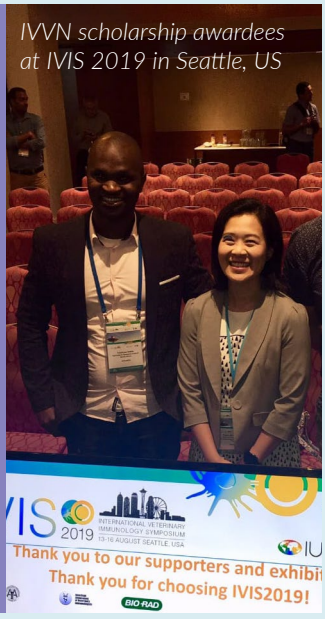



## Training for early career researchers

The IVVN is committed to supporting the training and development of early career researchers (ECRs), especially those working in LMICs. Through our **conference scholarships**, we have funded 54 places for ECRs and LMIC scientists at the IVVN's own annual conferences, supported 16 LMIC researchers to attend meetings in the United States, United Kingdom, Netherlands and Belgium, and provided funding to help organise a vaccinology course in The Gambia. Recipients of scholarships to attend our annual conferences are also invited to attend training workshops, with past workshops covering grant-writing and research ethics.

### IVVN Online Training Courses

Our members survey results in 2020 showed that 80% of LMIC respondents would like to see workshops in scientific skills being offered by the IVVN. Driven by this demand, we established a series of online training courses. These courses cover a range of scientific and soft skills, including bioinformatics, grant writing, project management and communicating research. The first round of seven online training courses took place this year, with 73 researchers from 17 low- and middle-income countries taking part. Turn to page 18 to find out more.




*IVVN scholarship awardees at IVIS 2019 in Seattle, US*

# Supporting scientific collaboration

The IVVN's catalyst funding schemes award collaborative research to tackle key bottlenecks in LMIC-relevant vaccine development.

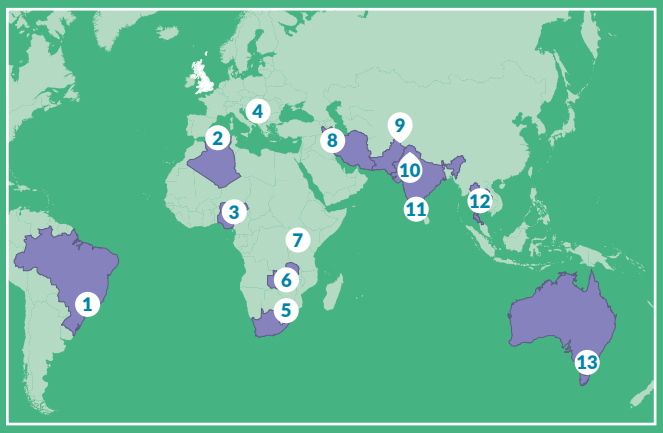
## Pump-priming projects

Since 2017, we have funded 13 **pump-priming projects**, with £1.2m awarded to projects covering a wide range of pathogens and host species.


> This project has been a wonderful opportunity for scientists working on tilapia in Southeast Asia to establish new collaborations within the region. The initial collaboration led to an IVVN-funded workshop on tilapia aquaculture, which has given rise to a vibrant network of tilapia health researchers across Vietnam, Thailand, Malaysia and Bangladesh.
>
> —**Dr Kim Thompson**, Moredun Research Institute, Principal Investigator of pump-priming grant on tilapia

## Laboratory exchanges

Our laboratory exchange partnerships facilitate training and transfer of skills and technology. We have funded 13 exchanges, with scientists from five continents working on projects with UK partners.




Read about all our funded pump-priming and laboratory exchange projects at intvetvaccnet.co.uk/catalyst-funding

# Promoting gender balance

The **IVVN African Schools Outreach Programme** is a collaborative project involving partners in the UK and Africa. The programme equips a network of women African scientists with the knowledge and tools they need to host interactive workshops in their local schools, with the ultimate goal of inspiring young girls to be the next generation of scientists. The timeline below shows the progress of the programme so far. Turn to page 23 to catch up with the team's latest activities.

**January 2019**
The first meeting of the project partners.

**February 2019**
'Rabies lab' workshop is designed by EBSOC and first mobile laboratory shipped.

**March 2019**
Formal launch on International Women's Day 2019. Later in the month, a training session and a pilot workshop are held in Kenya.

**April 2019**
Two more mobile laboratories shipped to scientists in Nigeria and Zambia.

**May 2019**
First Nigeria workshops delivered by two of the scientists trained in Kenya in March.

**June 2019**
Workshop delivered at a high school in Kenya by three of the scientists trained during the March visit.

**October 2019**

The programme launches in South Africa, Uganda and Ethiopia.

**March 2020**
First Zambia workshop delivered.

**June 2021**
After being disrupted by Covid-19, workshops resume.

**September 2020**

The programme is shortlisted for a Nature Research award.

To learn more about the programme, watch the video on our website.

nature research awards
Inspiring and Innovating Science

Last year, the IVVN, in partnership with Canada's International Development Research Centre (IDRC), launched a new **Fellowship Programme** specifically for women researchers in LMICs. Each fellow receives up to £50,000 to cover their research costs, travel and salary, allowing them to work with a local and international mentor on a nine-month project to advance the development of veterinary vaccines. You can read more about this programme on page 28.

# Organisational structure

The IVVN is directed by **Dr Timothy Connelley** and **Professor Bryan Charleston**, and is advised by a Network Management Board and an External Advisory Group comprising international experts from across the fields of human and veterinary vaccinology.

The Network is managed by **Dr Carly Hamilton**, with communications support by **Dr Mabon Elis** and administrative support by **Anne Syrett**. Please do not hesitate to contact the team at IVVN@roslin.ed.ac.uk if you have any questions or comments.

## Network Management Team

- Network Director: Dr Timothy Connelley, Roslin Institute, UK.
- Network Co-Director: Professor Bryan Charleston, The Pirbright Institute, UK.
- Network Manager: Dr Carly Hamilton, Roslin Institute, UK.
- Network Administrative and Communications Assistant: Dr Mabon Elis, Roslin Institute, UK.
- Network Administrator: Anne Syrett, The Pirbright Institute, UK.

## Network Management Board

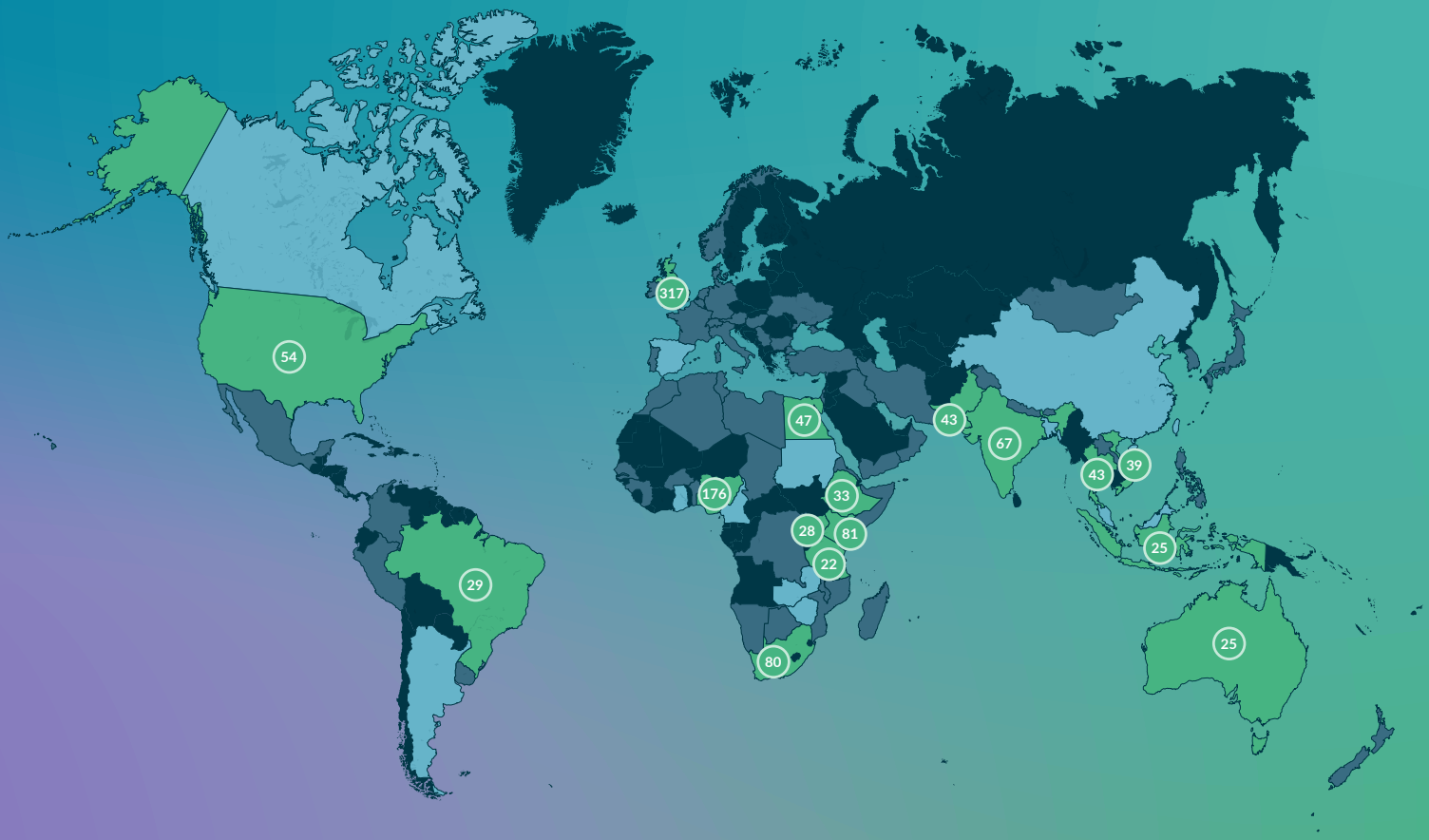
- Dr Pip Beard, The Pirbright Institute, UK.
- Dr Baptiste Dungu, Onderstepoort Biological Products, South Africa.
- Dr Michael Francis, BioVacc Consulting Ltd, UK.
- Professor Adrian Hill, The Jenner Institute, University of Oxford, UK.
- Dr Crystal Loving, USDA ARS
- Dr Michèle Mboo-Tchouawou, AWARD, Kenya.
- Dr Vish Nene, International Livestock Research Institute, Kenya.
- Dr Thảo Ngô, Biotechnology Center of Ho Chi Minh City, Vietnam.
- Professor Brian Perry, Universities of Oxford and Edinburgh, UK.
- Dr Carolin Schumacher, GALVmed, UK.
- Professor Fiona Tomley, Royal Veterinary College, UK.
- Professor George Warimwe, KEMRI-Wellcome Trust Research Programme, Kenya.

## External Advisory Group

- Dr Keith Sumption, Food and Agriculture Organisation of the United Nations.

# Membership

Since welcoming our first IVVN members in August 2017, our membership has grown steadily month by month. The Network now has more than 1,500 members in 93 countries around the world, and we would like to thank all of you for your continued contribution to the community we are building.




## Not yet a member of the IVVN?

Membership is free, and registering is quick and simple. Visit intvetvaccnet.co.uk/user/register to sign up. Benefits of being an IVVN member include:

- Being part of an international community of researchers working to develop improved vaccines for major livestock and zoonotic diseases.
- Access to potential collaborators from across the fields of veterinary and human vaccinology through our members directory.
- Networking opportunities through attendance at our conferences, workshops and online events. Members can also apply for scholarships to attend IVVN and other meetings.
- Members are eligible to apply for IVVN catalyst funding to accelerate their vaccine research.
- Opportunities to host and attend workshops on specific vaccine-related topics.
- Notification of news, events, training, funding and publications in our monthly newsletters.

# A year of **IVVN online events**

From symposia to training courses, online events have been an important part of our networking activities in 2021. What started as an adaptation to the Covid-19 pandemic has grown to become an exciting way to bring our community together.

*A year of IVVN online events*

As for so many other organisations, the Covid-19 pandemic meant cancelling all our in-person activities, including our 2020 annual conference in Vietnam and our IVVN workshops.

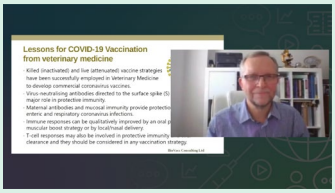
Responding to this, we began hosting online events in September 2020, with a timely webinar on coronavirus vaccination. This was followed by more webinars and a series of online symposia based on our original 2020 conference programme.

# Webinars

Click the links to watch the webinars, or access all past and upcoming webinars at intvetvaccnet.co.uk/events/ivvn-webinars

## One Health, Covid-19 and lessons from veterinary vaccination

Our webinar series began with a talk from **Dr Michael Francis**, managing director at BioVacc Consulting Ltd and a member of the IVVN's Network Management Board. Dr Francis discussed veterinary coronaviruses, and the lessons veterinary vaccination can offer to human vaccinology. Watch here.




## Catalysing elimination of dog-mediated human rabies by 2030 in Africa

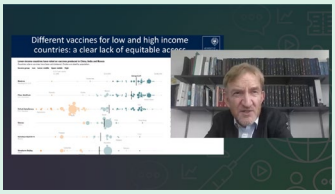
The second IVVN webinar was given by **Dr Thumbi Mwangi**, who holds positions at Nairobi, Washington State and Edinburgh universities. Dr Mwangi discussed rabies vaccination and the goal to eliminate the disease in Africa by 2030. Watch here.


## Experiences with supporting rinderpest vaccination delivery in South Sudan and lessons learned for control of other diseases

**Dr Bryony Jones** from the Royal Veterinary College gave our third webinar, which focused on the now-eradicated disease rinderpest. Dr Jones spoke about her work as part of the rinderpest elimination efforts in South Sudan. Watch here.

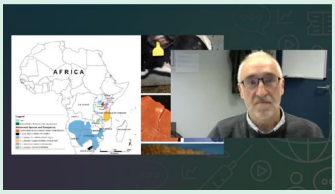

## Global health vaccines: platforms and progress

For our fourth webinar, **Professor Adrian Hill** looked at two very different vaccine development stories: 111 years of malaria vaccine research, and the rapid development of Covid-19 vaccines. Professor Hill is director of Oxford's Jenner Institute and is part of the team behind the Oxford/AstraZeneca Covid-19 vaccine. Watch here.




## Development of a vaccine for malignant catarrhal fever – and potential consequences for the livestock-wildlife interface

Our fifth webinar saw Dr George Russell from the Moredun Research Institute discuss a vaccine for malignant catarrhal fever. The team is working with Onderstepoort Biological Products to produce the vaccine for use in South Africa. Watch here.




We are grateful to Professor Brian Perry for chairing our webinars and to all the speakers and attendees who have taken part in the programme. The webinar series is continuing, and if you would like to suggest a topic or speaker, we would love to hear from you.

*A year of IVVN online events*

## Marking International Women's Day 2021

# IVVN-AWARD webinar

Building on this year's International Women's Day theme, the IVVN, together with **African Women in Agricultural Research and Development** (**AWARD**), hosted a webinar in March on women in science and leadership.

The discussion, hosted live online, saw four women with different scientific backgrounds share their experiences and highlight the challenges and opportunities for women in science, technology and innovation.

UN Women's theme for this year's International Women's Day was '**Women in leadership: achieving an equal future in a Covid-19 world**'. The webinar built on this theme by exploring how we can pave the way for more women to access science careers, grow into leadership, and last in those leadership positions to sustain the pipeline.

The webinar was moderated by AWARD's deputy director, Dr Michèle Mbo'o-Tchouawou, who introduced the session as a conversation about the systemic barriers that perpetuate the gender gap in science, and a chance to highlight opportunities for closing this gap.

> While we continue to applaud women's outstanding achievement in these fields, we also continue to acknowledge with force that there is still a long way towards supporting and even inspiring more young women to explore and embrace science careers, grow their leadership potential and effectively influence the agenda and the vision for science and technology development in different parts of the world.
>
> —**Dr Michèle Mbo'o-Tchouawou**, AWARD

The discussion began with our four panellists sharing their experiences as women in different areas of science.

The first of the four panellists to speak was Dr Cathrine Ziyomo, a senior scientist and director of the BecA-ILRI Hub in Kenya. She spoke about the impact her female supervisor had on her early in her career, and discussed the importance of investing in your own future.

> The value of mentors and role models is very, very critical in the success of women – just knowing and seeing someone who looks like you actually making it and succeeding in their position.
>
> —**Dr Cathrine Ziyomo**, BecA-ILRI Hub

Next up was Dr Esther Kanduma, a scientist at the University of Nairobi, Kenya. She too highlighted the importance of mentors, as well as using our networks and partnerships to succeed.

> The world needs women, and science needs women, and I think all of us have a role to play to promote the full and effective participation of women in science.
>
> —**Dr Esther Kanduma**, University of Nairobi


*The chair and four panellists taking part in a discussion during the webinar.*

The third of our panellists to address the audience was Jayne Quoiani, who works as a science outreach officer at the Roslin Institute, University of Edinburgh. She spoke of the importance of making women more visible in science through public engagement.

> It comes back to the effects of having women under-represented in science, because you can't be what you can't see.
>
> —**Jayne Quoiani**, University of Edinburgh

And Dr Barberine Silatsa Assongo from the University of Dschang, Cameroon, gave her perspective as a francophone researcher, and the value of her mentors' support. She joined us from Canada, where she has been working as a risk adviser with the Canadian Red Cross, helping to support the control of Covid-19, including mass vaccination.

> This webinar is a live example of the willingness of people to sit down to acknowledge that there is a problem, to talk about it and to see how we can find solutions.
>
> —**Dr Barberine Silatsa Assongo**, University of Dschang

The discussion then turned to how the leaky pipeline, whereby early career women scientists leave the profession, can be fixed. Jayne Quoiani said that it was important to consider what happens before women become scientists in the first place, and that many traditional stereotypes in society still exist. "There's a considerable problem with the strength of the pipeline before we even consider that it's leaky, I would suggest," she said.

Dr Cathrine Ziyomo said that institutions need to put arrangements in place to achieve diversity. "It is not only a question of retention or recruitment into these positions, but also promotion, and the support that we need to make sure that we also succeed, and we can also mentor and support others that are coming up." Dr Ziyomo said.

Dr Esther Kanduma suggested that having gender champions may be a good way of realising change in the face of institutional inertia. "We need to have voices with a lot of force that can make our institutions implement that which they have promised."

We are grateful to all the panellists for making the webinar such an engaging session, and to all the participants who attended for joining in the discussion. We are also grateful to Dr Michèle Mbo'o-Tchouawou for chairing the session and to AWARD for jointly organising the session.

## African Women in Agricultural Research and Development (AWARD)

AWARD
African Women in Agricultural Research and Development

African Women in Agricultural Research and Development (AWARD) works toward inclusive, agriculture-driven prosperity for Africa by strengthening the production and dissemination of more gender-responsive agricultural research and innovation. We invest in African scientists, research institutions, and agribusinesses so that they can deliver agricultural innovations that better respond to the needs and priorities of a diversity of women and men across Africa's agricultural value chains.

## About the panellists

**Dr Michèle Mbo'o-Tchouawou (chair)**
Deputy Director of AWARD

**Dr Cathrine Ziyomo**
Senior Scientist and Director, BECA-ILRI Hub

**Dr Esther Kanduma**
Lecturer, University of Nairobi, and AWARD Fellow

**Jayne Quoiani**
Education & Engagement Officer, Roslin Institute, University of Edinburgh

**Dr Barberine Silatsa Assongo**
Research Fellow, University of Dschang, and Africa Biosciences Challenge Fund Fellow

## Watch a recording of the webinar

The webinar was recorded, so if you missed it, you can watch the whole session by going to the webinars section of our website. Click here to access the recording.

*A year of IVVN online events*

# IVVN virtual symposium series

The IVVN hosts annual scientific conferences that bring members together to form novel collaborations, and the Network has successfully hosted conferences in Nairobi in 2018 and in London in 2019.

However, our third annual conference, originally scheduled for March 2020 in Hanoi, Vietnam, was unfortunately cancelled because of the Covid-19 pandemic.

Instead of postponing the talks until we could hold our conference as planned, we decided to host the original programme as a series of online symposia. The programme's four host system-specific themes (Vaccines for Swine, Poultry, Ruminants and Aquaculture) were each held as a standalone symposium, with members from around the world joining to hear from our speakers.

All four symposia were held on an interactive online platform that allowed participants to ask questions after each talk and to move between breakout groups during the poster sessions.

We are grateful to all our speakers, poster presenters, session chairs, all our attendees, and our symposium sponsors – Zoetis, The Bloomsbury SET and Phibro.

The symposia are summarised below, and you can watch recordings of all the sessions on our website.

## December 2020
## Vaccines for Swine

The first of our symposia, Vaccines for Swine, took place on 16 December 2020 and brought together 80 participants from across the globe. Professor Simon Graham from the Pirbright Institute in the UK and Dr Filip Claes from the Emergency Centre for Transboundary Animal Diseases in Thailand kindly chaired the symposium.

Professor Xiangxi Wang (Chinese Academy of Sciences) and Dr Christopher Netherton (Pirbright Institute) began the symposium with talks on African swine fever. Next, Dr Peera Jaru-Ampornpan (BIOTEC, Thailand) spoke about porcine circovirus 2 and Dr Rebecca McLean (Pirbright Institute) presented research on developing a 'One Health' Nipah virus vaccine.

Awardees of IVVN pump-priming grant funding also presented, with Dr Anna Lacasta (ILRI, Kenya) discussing her project on African swine fever a joint presentation from Professor Marshall Lightowlers (University of Melbourne, Australia) and Professor Bryan Charleston (Pirbright Institute) on their project *Taenia solium* vaccination project.

### Recording


A recording of the symposium is available on our website.

## February 2021

# Vaccines for Poultry

We co-hosted our second symposium, Vaccines for Poultry, with the GCRF One Health Poultry Hub on 25 February 2021. Seven speakers and 130 attendees took part in the symposium, which was chaired by the One Health Poultry Hub's director, Professor Fiona Tomley, and Professor Hualan Chen from the Harbin Veterinary Research Institute in China.

Professor Brendan Wren (London School of Hygiene and Tropical Medicine) opened the session with a talk on recombinant glycoconjugate vaccines. The next two talks covered avian influenza, with Professor Hualan Chen discussing the zoonotic H7N9 strain and Professor Munir Iqbal (Pirbright Institute, UK) presenting research on selective targeting of vaccine antigens.

Next, Professor Susantha Gomis (University of Saskatchewan, Canada) spoke about innate immunity and delivery of immunostimulatory agents, before we returned to avian influenza and the H9N2 strain with Melina Jonas (PT Medion Farma Jaya, Indonesia).

The final two presentations featured IVVN pump-priming grant awardees talking about their projects. Dr Kate Sutton (Roslin Institute, UK) led a project that tested edible vaccines in chickens, and Dr Mariatulqabtiah Abdul Razak (Universiti Putra Malaysia) is testing the immunogenicity of nodavirus-like particles, which could be used as universal vaccines against avian influenza.

### Recording


A recording of the symposium is available on our website.

## April 2021

# Vaccines for Ruminants

Our third symposium on 26 April 2021 covered Vaccines for Ruminants and was chaired by Professor Bryan Charleston (Pirbright Institute, UK) and Professor Yanmin Li (The Southwest Minzu University , China).

Professor Vivek Kapur (Pennsylvania State University, US) discussed his research on bovine tuberculosis and the BCG vaccine. We then heard from Dr Yu Qiu (World Organisation for Animal Health, Thailand), who spoke about the OIE Southeast Asia and China foot-and-mouth disease control campaign.

Next, Professor Juan Mosqueda (Autonomous University of Querétaro, Mexico) spoke about a vaccine candidate against bovine babesiosis, and Dr Tom McNeilly (Moredun Research Institute, UK) discussed efficacy testing of Q-fever vaccine candidates.

Finally, Dr Caroline Wasonga (University of Nairobi, Kenya) and Dr Pamela Opperman (ARC-Onderstepoort Veterinary Research, South Africa) presented their IVVN pump-priming projects on Nairobi sheep disease and foot-and-mouth disease, respectively.

### Recording


A recording of the symposium is available on our website.

*A year of IVVN online events*

## July 2021

# Vaccines for Aquaculture

The last of the four symposia, on Vaccines for Aquaculture, was held on 6 July 2021, with Professor Alexandra Adams (who retired from the University of Stirling last year) and Dr Thảo Ngô (Biotechnology Center of Ho Chi Minh City, Vietnam) chairing.

We heard first from Dr Nopadon Pirarat (Chulalongkorn University, Thailand), who spoke about nanoparticle mucosal vaccines for use in tilapia, and then from Dr Carolina Tafalla (Animal Health Research Centre, Spain), who spoke about adjuvants and how they work.

Next, we heard about expression platforms for fish vaccines with Dr Nguyen Duc Hoang (Vietnam National University), who discussed *Bacillus subtilis* systems, and Dr Ansgar Stratmann, who presented Aquatreck Animal Health's *Pichia pastoris* system.

Up next was Dr Zhen Tao (Zhejiang Ocean University, China), who spoke about development of a live vaccine for *Pseudomonas* in large yellow croaker, followed by Dr Sean Monaghan, whose talk covered prospects for a sealice vaccine.

Finally, we heard from two IVVN pump-priming grant holders; Dr Thảo Ngô introduced her project on *Aeromonas* vaccines for tilapia and Vietnamese catfish, and Dr Kim Thomson (Moredun Research Institute, UK) spoke about the project she led, which developed immunological tools for monitoring the immune response in tilapia.

### Recording


A recording of the symposium is available on our website.

# Symposium sponsors

Many thanks to our three symposium sponsors, Zoetis, The Bloomsbury SET and Phibro, for supporting the IVVN virtual symposium series.

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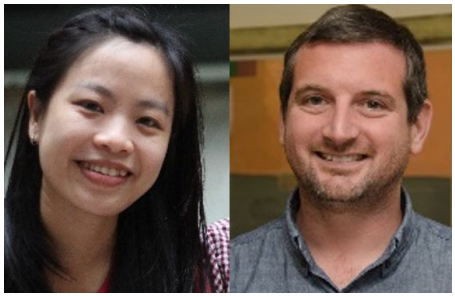
# Online workshop

The team leading the IVVN-funded pump-priming project 'Efficacy testing of novel immersion and oral vaccines for *Aeromonas hydrophila* in tilapia and Vietnamese catfish' held a closing workshop for the project using our online events platform.

In this report, **Dr Ngô Huỳnh Phương Thảo** and **Dr Andrew Desbois** write about their project and the workshop they organised.

On 27 September 2021, 68 IVVN members from 28 different countries joined a virtual workshop to hear about the main outcomes from an IVVN-funded pump-priming project on vaccine development for pangasius and tilapia. Dr Ngô Huỳnh Phương Thảo (Biotechnology Center of Ho Chi Minh city, Vietnam) and Dr Andrew Desbois (University of Stirling, UK) co-chaired the half-day virtual workshop, which was organised to close the project. The aim of the workshop was to share the project findings with the IVVN community, unlock future collaborations and expedite commercialisation.



*The workshop was organised by Dr Ngô Huỳnh Phương Thảo and Dr Andrew Desbois.*

The project sought to develop oral and immersion vaccines for diseases caused by aeromonad pathogens that impact tilapia and catfish farms, including in the major producing countries of Egypt and Vietnam. Vaccines are an excellent way to reduce disease outbreaks and the need for antibiotic therapy, which therefore can help in the fight against bacterial antimicrobial resistance. Moreover, vaccines delivered in feed or by bathing the fish negate the need for highly trained personnel and specialist equipment, which are required for injectable versions.

At the start of the workshop, Prof Dang Thi Hoang Oanh (Cantho University, Vietnam) and Prof Alaa Eldin Eissa (Cairo University, Egypt) detailed the scale of aquaculture and Aeromonas issues affecting pangasius culture in Vietnam and tilapia farms in Egypt. Dr Michaël Bekaert (University of Stirling) described the power of bioinformatics approaches for tackling bacterial pathogens in aquaculture, before Dr Andrew Desbois provided an overview of the project aim, objectives and team.

Dr Kerry Bartie (University of Stirling) outlined the approach taken to genotype the >500 isolates collected in the project to identify the strains responsible for most of the *Aeromonas* outbreaks included in the study. In addition to preparing vaccines with inactivated whole bacterial cells, Prof Dirk Werling (Royal Veterinary College, London) described the yeast expression platform used to create an innovative recombinant vaccine.

During the final presentations of the morning, Dr Ngô Huỳnh Phương Thảo presented the results from the vaccination trials performed in pangasius, where the novel immersion and oral vaccine conferred protection of up to 100% relative percent survival compared to controls, whilst Dr Andy Shinn (INVE, Thailand) shared the very promising data obtained in their study on tilapia. The workshop concluded with a Q&A session that allowed participants to quiz the project team, which comprised researchers from Vietnam, Thailand, Egypt and the UK.

The pump-priming project "Efficacy testing of novel immersion and oral vaccines for Aeromonas hydrophila in tilapia and Vietnamese catfish" commenced in 2018 and was funded by the IVVN.

For more information on the workshop and project, please contact Dr Ngô Huỳnh Phương Thảo (nhpthao.snn@tphcm.gov.vn) and Dr Andrew Desbois (andrew.desbois@stir.ac.uk).

## Run your own IVVN workshop

An IVVN workshop is a great way to bring together researchers working in a specific area of veterinary vaccinology. If you would like to organise an IVVN workshop, we can help you by promoting the event to members, managing invitations/registrations, hosting the event online, and providing technical assistance. Contact the IVVN team at IVVN@roslin.ed.ac.uk to discuss.

*A year of IVVN online events*

# Online training courses

In January this year, we were delighted to be awarded additional funding to design and implement a series of online training courses specifically for early career researchers in low-and-middle income countries.

It is widely recognised that challenges faced by early career researchers in low- and middle-income countries (LMICs) include a lack of resources, reduced access to training opportunities compared with early career researchers in high-income countries, and a lack of funding for research projects. These challenges were highlighted in the IVVN's 2020 members' survey, with many IVVN members based in LMICs saying they would benefit from training courses run by the Network.

With in-person training courses not possible because of Covid-19, we decided to design a series of online training courses for members. These courses were made possible with funding from the University of Edinburgh's annual Scottish Funding Council Global Challenges Research Fund allocation.

Seven courses were included as part of the series, and these covered a range of scientific and soft skills, including bioinformatics, science communication, experimental design, ethics, grant writing and project management. Places on each course were competitively allocated to successful applicants who were early career researchers based in organisations in LMICs.

## The courses

### Essential bioinformatics

This training course was delivered by Edinburgh Genomics, and focused on bioinformatics essentials for biologists. The first two sessions introduced participants to Linux and using command line tools for biology. The remaining three sessions covered R basics, vectors, loading data, data frames and iteration and data visualisation.

### Making effective oral and poster presentations

This course was delivered by staff at the International Livestock Research Institute (ILRI) and gave participants an overview of how to plan and deliver effective presentations. Key topics included the basics of a good presentation, how to rehearse and reduce anxiety, how to understand and engage the audience, and tips on designing effective slides and posters.

### Grant writing course

This course was delivered by communications experts at Scriptoria, and taught researchers critical skills to write effective research proposals and win funding. Participants were led through the process by which funders evaluate proposals and reviewed examples of real proposals in an interactive session. Participants were also trained in effectively communicating complex research ideas to a less specialist panel review audience.

### The what, why, who, where and how of public engagement – becoming an engaged researcher

In this course, delivered by public engagement specialists at the Roslin Institute, the focus was on focus communicating science to non-specialist audiences. The course provided an introduction to engaging different audiences, and gave participants

an opportunity to build their public engagement and communication skills.

## Integrating gender into livestock research

This course was delivered by the growing ILRI gender team and encouraged participants to think about how to integrate gender into their research. The interactive sessions focused on why and how to do gender research, with participants interacting directly with the instructors and each other.

## Project management course

This course from Scriptoria introduced researchers to some of the critical skills and tools needed for managing projects, resources, and teams. The course covered the project cycle in detail, including preparation, implementation, management and evaluation.

## Ethics, experimental design and the 3Rs in animal infectious disease research

The seventh of our online training courses was delivered by the University of Nottingham and examined the ethical issues raised by animal infectious disease research, with a focus on the 3Rs (replacement, reduction and refinement), research ethics review and ethics by design in research planning.

# Feedback

In the first round of our online training courses, 138 places were awarded to 73 researchers from 17 LMICs.

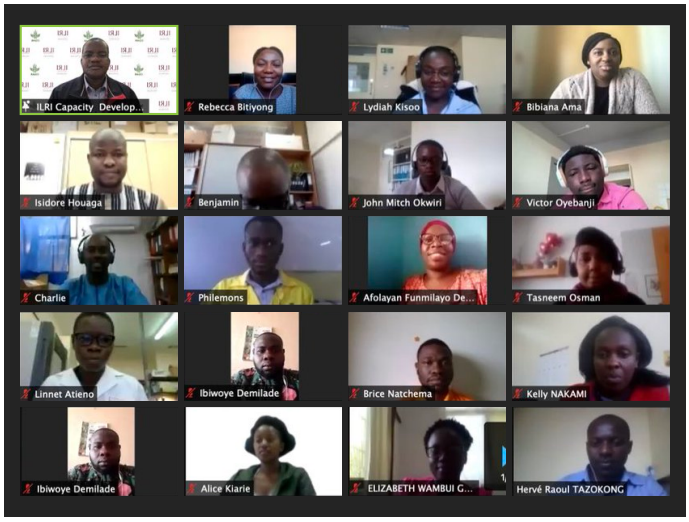
After attending a course, participants were invited to take part in an online survey to give their feedback. Of the 63 participants who completed this feedback, 97% described the course they attended either as very good or excellent.

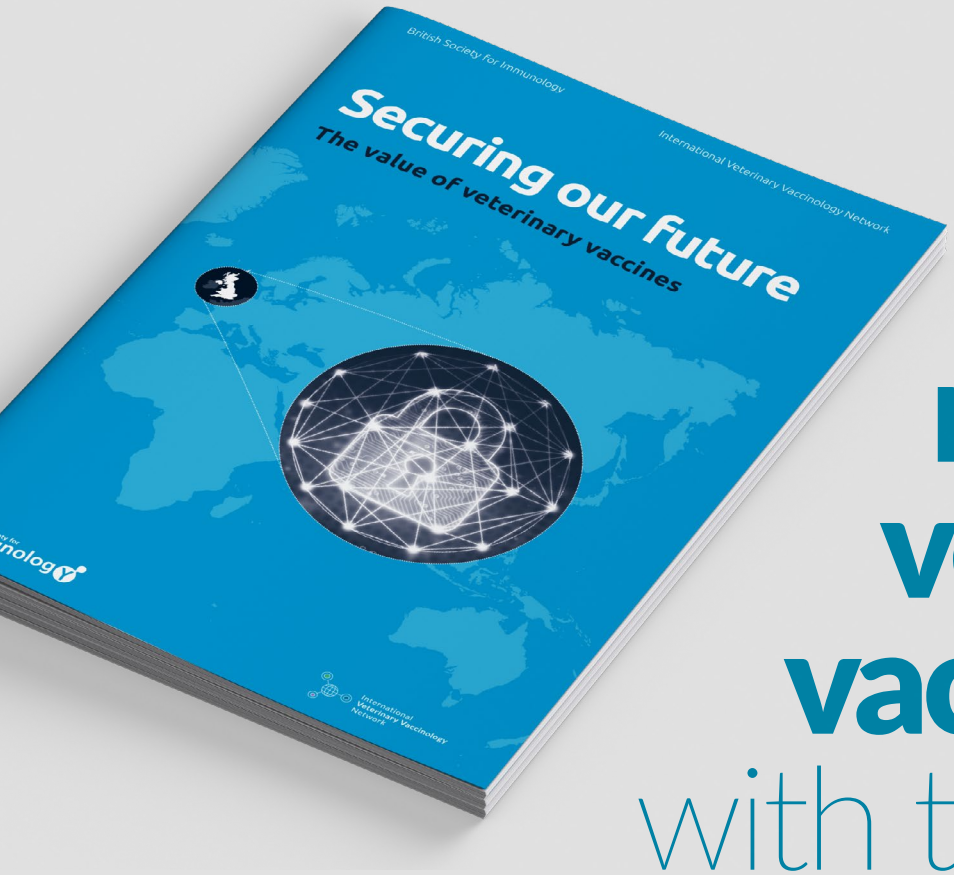
> The course was well run and informative. The instructors were patient and happy to go back when a participant was stuck. All tools and workbooks were provided, and sessions were recorded so that we could look back at any point for guidance.
>
> —Participant on the **Essential Bioinformatics** course

> This course was well-presented and had group work examining various shortcomings in submitted projects proposals. I highly recommend this to PhD students and early career scientists.
>
> —Participant on the **Ethics, Experimental Design and the 3Rs** course

> The course came at the right time for me. I am currently running a few projects and it was getting daunting. After the course, I am able to organise my projects well enough while exploiting the tools that I was introduced to in the course. One of the best courses I have attended.
>
> —Participant on the **Project Management** course

> The course was informative and well-rounded to enable the participants to become efficient and confident presenters. After the course I can now make my presentations more relevant and avoid losing the interest of the audience.
>
> —Participant on the **Effective Presentations** course






# Joint report on veterinary vaccinology with the British Society for Immunology

Urgent investment in veterinary vaccinology is crucial to secure global health, wealth and security. We collaborated with the British Society for Immunology to make the case for improved funding, career development and industrial capacity to secure the future of the sector in the UK and globally.

Urgent strategic investment in veterinary vaccinology is crucial to ensure we are prepared for future disease threats, according to a new report published today by the British Society for Immunology and the International Veterinary Vaccinology Network.

Veterinary vaccinology research in the UK has underpinned significant advances in animal and human disease control, from the eradication of the cattle disease rinderpest to the development of Covid-19 vaccines. But this legacy is under threat from a lack of investment in several essential areas.

"The UK is a world leader in veterinary immunology and vaccinology, but without sustained investment, we risk losing the significant economic benefit derived from our excellence and leadership in this area," says Dr Doug Brown, chief executive of the British Society for Immunology. "Investing in all aspects of veterinary vaccinology, including research, skills development, collaborations and infrastructure, means investing in our future."

The report brings together perspectives from UK and global experts in veterinary vaccinology, including academics, funders and industry representatives.

"During the development of the report, it was a real pleasure to reflect on the massive beneficial impact research and development of veterinary vaccines has had both in the UK and globally," says Dr Timothy Connelley, director of the IVVN. "We hope that this strong foundation can be maintained

and built upon by ensuring the continued support for future generations of veterinary vaccine researchers."

One important challenge identified in the report is supporting the next generation of veterinary vaccinologists. Research by the British Society of Immunology has shown that few immunologists consider a career in veterinary immunology, and many in the field cite a lack of upcoming talent as one of the biggest barriers to future vaccine development.

"This report highlights the unique strength of British veterinary vaccinology and immunology but indicates that increased investment in research and career development is essential to maintain this leading position," says Dr Elma Tchilian from The Pirbright Institute, who contributed to the report.

Another recommendation made in the report is prioritising a One Health approach, the importance of which has been highlighted more than ever by the Covid-19 pandemic. Dr Michael Francis, IVVN board member and managing director of BioVacc Consulting Ltd, said: "This report on veterinary vaccines is very timely in light of the recently highlighted risk posed by zoonotic diseases such as Covid-19 and the importance of collaboration between human and veterinary medicine in tackling any future pandemic disease threats."

This collaboration between human and veterinary researchers is an integral part of vaccinology according to another of the report's contributors, the University of Edinburgh's Professor Gary Entrican. "The origins of modern vaccinology are firmly embedded in the animal-human interface, perfectly exemplified by Edward Jenner's pioneering experiments on vaccination against smallpox," Professor Entrican said. "We must never lose sight of the fact that animals and humans share a common ecosystem and that vaccines provide a unique, sustainable route to global wellbeing for all."


## Download

Download a copy of the report at
intvetvaccnet.co.uk/vaccines-report

# *News* IVVN board members awarded for their services to animal and public health

Two members of the International Veterinary Vaccinology Network (IVVN)'s Network Management Board were recognised in this year's Queen's birthday honours list.

Professor Fiona Tomley, Professor of Experimental Parasitology at the Royal Veterinary College, was awarded a CBE for services to animal health. Professor Tomley is director of the UKRI GCRF One Health Poultry Hub, an interdisciplinary research programme working in Bangladesh, India, Sri Lanka and Vietnam.

> I am both surprised and thrilled at this news. I always felt lucky to be born into a generation with access to state-supported university education, and to have parents who encouraged me to pursue a dream of 'doing science' when many women from a similar background were actively deterred from having careers.
>
> The past year has once again highlighted that understanding the root causes, detection, prevention and treatment of infectious disease is critically important. I hope this will stimulate the next generation of women, and men, to pursue the most exciting, challenging and rewarding of careers. Science may not be everything but as Rosalind Franklin said, 'Science, for me, gives a partial explanation for life. In so far as it goes, it is based on fact, experience and experiment.
>
> —**Professor Fiona Tomley**

Professor Adrian Hill, director of the Jenner Institute and Professor of Vaccinology at the University of Oxford, received an honorary knighthood for services to science and public health. Professor Hill is a key member of the team behind the Oxford-AstraZeneca Covid-19 vaccine.

> I am delighted to receive this award which reflects the efforts of so many colleagues at the Jenner Institute. This recognises not just the extraordinary efforts of those who worked on the COVID vaccine programme, but also a remarkable sequence of talented students, research fellows and senior investigators over the last 25 years.
>
> Their efforts in designing, developing and clinically testing vaccines against globally important diseases allowed us to select the most effective vaccine type to address the pandemic. Hopefully, today's awards will encourage more aspiring scientists to consider a career in vaccinology which has ever widening life-saving applications, as illustrated so well over the last year.
>
> —**Professor Adrian Hill**

> The IVVN is so fortunate to have Fiona and Adrian as key members of the board. Their recognition in the honours list is well deserved and reflects on the importance of their work and the contributions both have made to the animal health and vaccine research communities during their careers.
>
> —**Dr Timothy Connelley**, IVVN director

Others rewarded in the Queen's birthday honours list include Professor Sarah Gilbert from the Jenner Institute, who received a damehood, and Professor Teresa Lambe, who received an honorary OBE.


# Outreach activities resume in Kenya and Nigeria

After months of disruption and cancelled activities because of Covid-19, we were delighted to have the IVVN African Schools Outreach Programme's workshops started up again this year.

*African Schools Outreach Programme*

# About the IVVN African Schools Outreach Programme

The IVVN African Schools Outreach Programme (ASOP) was established in March 2019 and aims to provide women working in veterinary vaccinology in Africa with training and resources to host outreach workshops in their local schools to inspire the next generation of scientists.

The programme involves a 'rabies lab' workshop designed by public engagement specialists at the University of Edinburgh. The workshop gives students hands-on experience of scientific techniques and teaches them the importance of vaccinating animals against devastating diseases that affect livestock and the livelihoods of farmers in Africa and globally. Everything required for the workshop is contained within a mobile 'laboratory in a suitcase', which local ASOP instructors take with them from school to school.

Through our partnership with African Women in Agricultural Research and Development (AWARD), the programme also seeks to inspire the next generation of women scientists in Africa. The workshops expose students to successful examples of outstanding women vaccine scientists, helping to break down stereotypes about women and science.

The first phase of the programme saw scientists from Cameroon, Kenya, Nigeria and Zambia receiving training and delivering workshops, while the second phase added members from Ethiopia, South Africa and Uganda to the team.

Because of the nature of the programme, our schools outreach activities have been inevitably and severely disrupted by Covid-19 since March 2020. But in June this year, with the loosening of some restrictions, it was great to see the workshops resume. Read about the latest workshops in Kenya and Nigeria on the following pages, and turn to page 27 to read about the success of the outreach team in being shortlisted for Nature Research's science outreach award in 2020.

*African Schools Outreach Programme*

# ASOP team visit two schools in Ogun State, Nigeria


Dr Funmilayo Ibitayo Deborah Afolayan from the University of Ibadan, Nigeria, is one of the scientists trained during the first phase of the outreach programme in March 2019. Earlier this year, she recruited and trained five researchers from her university to be ASOP instructors. This training included how to communicate effectively with school students, as well as how to effectively use all the equipment included in the mobile laboratory during the workshop.

Following the training session, the team prepared their suitcase laboratory and travelled to Ogun State. There, they visited United High School and Isanbi Comprehensive High School to deliver the outreach workshop to 160 students aged between 10 and 19 years old.

During the workshop, students learned about the importance of vaccination and were taught how to use a micropipette. They then performed an experiment to identify the percentage of dogs that had received a rabies vaccine and interpreted and discussed their results. After the experimental session, the students had the opportunity to ask the six scientists leading the workshop about their careers and what inspired them to become scientists.

On their visit to Isanbi Comprehensive High School, the team was also joined by members of the Nigerian chapter of African Women in Research and Development (NiAWARD). AWARD and their country chapters have been partners of the ASOP scheme since it launched, and this partnership allows students taking part in workshops to meet more scientists and hear about their experiences and careers.

> My favourite part of the workshop was the rabies vaccination experiment because the scientists taught us that if our dog is not vaccinated they could transmit rabies to humans.
>
> —**Workshop participant**

*African Schools Outreach Programme*

# ASOP and KeAWARD deliver workshops in Kenya

Like the team in Nigeria, the Kenyan ASOP team also resumed activities in June this year and visited two schools in Nakuru and Laikipia counties. Scientists trained as part of the programme in 2019 were joined at the workshops by members of the Kenyan chapter of African Women in Agricultural Research and Development (KeAWARD).

The first of the team's visits was to Naivasha Girls Secondary School on 12 June. During this visit, the team hosted two rabies lab workshops, engaging 82 girls aged 16-17 years old.

An important part of the workshop is that the students can interact with the scientists leading the experiment to find out more about being a scientist.

> My favourite part of the workshop was interacting with the scientists, because they are all women who are dominating in the field of science, and this inspires me very much.
>
> —**Workshop participant**

Following the experimental session, the team gave mentorship and career guidance presentations to 1,000 schoolgirls in the school hall.

Three days later, on 15 June, the team visited St Loise Girls Secondary School and hosted the hands on workshop to 40 girls aged 13-19 years old.

Feedback collected from both school visits showed that all the girls agreed women can be scientists and that they could become scientists in future.

In feedback provided after the workshop, students said they had learned a lot about how vaccines are used to prevent animal and human diseases from spreading, and that they would share their experience with their families.

At the end of both school visits, the ASOP team, teachers and students marked the occasion by planting trees to symbolise the mentorship visit, promote afforestation and teach the students about conservation.

*African Schools Outreach Programme*

# Programme shortlisted for 2020 Nature Research outreach award

We were delighted that the African Schools Outreach Programme was shortlisted for a Nature Research Award for Inspiring & Innovating Science in 2020. The programme was shortlisted in the Science Outreach category, which recognises initiatives that support girls or young women to engage with, enjoy and study STEM subjects, or work that increases the retention of women in STEM careers.

Publisher Nature Research, in partnership with the Estée Lauder Companies, established the award in 2018. The award also has a Scientific Achievement category, which recognises early-career women researchers.

The African Schools Outreach Programme is a collaborative project involving partners based in the UK and Africa including the IVVN, the Easter Bush Science Outreach Centre (EBSOC) at the University of Edinburgh, African Women in Agricultural Research and Development (AWARD), the African Vaccinology Network (AfVANET), the International Livestock Research Institute (ILRI), the University of Buea, the University of Ibadan and the University of Zambia. By providing women scientists working in veterinary vaccinology in Africa with public engagement training and resources, the programme aims to equip a network of African scientists with the knowledge and tools to host outreach workshops in their local schools, with the ultimate goal of inspiring young girls to be the next generation of scientists.

The workshops focus on the importance of animal vaccines to prevent devastating diseases of livestock on which millions of African livelihoods depend. During the workshops, students learn how to use a micropipette, perform their own experiments and have the opportunity to interact with the scientists running the workshop to hear about their careers and ask questions. To date, the programme has reached over 200 students across schools in Kenya, Nigeria, Zambia and South Africa, and will be implemented in schools in Cameroon, Ethiopia and Uganda in the future.

Congratulations to the whole outreach team for their success and to Dr Glory E Mbah, University of Buea, Cameroon, who led the team's application for the award. Congratulations also to the other shortlisted projects – the Organisation for Women in Science for the Developing World (OWSD), GFPA Aviation/ Space Camp, Teen Turn and Promoting Geoscience Research, Education and Success (Progress) – and the 2020 winners, Chicas en Tecnología.

> We are dedicated to ensuring that young African females learn to love science enough to be eager to participate in building, and leaving behind a better continent for the generations to come.
>
> —**Dr Glory E Mbah**, University of Buea

# *News* Mentoring fellowships for women in low- and middle-income countries awarded

On 8 March this year, International Women's Day, it was a great pleasure to announce the first six women from low- and middle-income countries (LMICs) who have received funding as part of the IVVN fellowship programme.

The programme was launched for applications in 2020 and is jointly funded by Canada's International Development Research Centre (IDRC).

The theme of this year's International Women's Day was "Women in leadership: Achieving an equal future in a Covid-19 world."

The pandemic has highlighted the importance of vaccination and the need for continued development of vaccines for livestock and zoonotic diseases. However, women continue to be underrepresented in agricultural research and in leadership positions, particularly in LMICs.

The fellowship programme was designed to support women postdoctoral scientists working at research organisations in LMICs. The programme provides funding for fellows to work on a defined piece of research addressing a key bottleneck preventing the development of vaccines.

Mentoring is a key component of the fellowship programme, with awardees being supported by a local and international mentor. Fellowships will also support each awardee's professional development, build research capacity within the fellows' research organisations, and accelerate the development of vaccines for livestock and zoonotic diseases.

Funding this year was awarded to six awardees based in Brazil, Egypt, India, Kenya and South Africa and fellowship projects focus on a variety of pathogens including coronaviruses, tilapia lake virus, Newcastle disease virus, *Salmonella enterica*, *Streptococcus agalactiae*, *Staphylococcus aureus* and *Theileria annulata*.

Many congratulations to all fellowship awardees!


Read more about each of the fellows and their projects on our website, where you can also watch our announcement video: intvetvaccnet.co.uk/news/mentoring-fellowships-for-women-in-low-and-middle-income-countries-awarded

**Dr Mercy Yvonne Akinyi** from the Institute of Primate Research, Kenya, is characterising coronaviruses in non-human primates.

**Dr Amany Hassan** from Alexandria University, Egypt, is working on vaccine development for tropical theileriosis.

**Dr Sreeja Lakshmi** from the Kerala University of Fisheries and Ocean Studies, India, is looking at nanoparticle vaccine development for tilapia.

**Dr Angela Makumi** from ILRI, Kenya, is working towards a bacteriophage-based vaccine for *Salmonella* in poultry.

**Dr Laura Oliveira** from the Federal University of Rio de Janeiro is working on contagious mastitis control and prevention in Brazil.

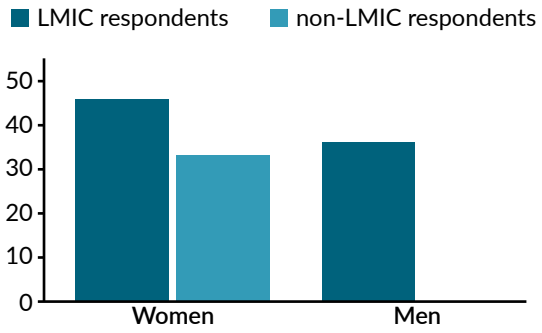
**Dr Tanja Smith** from the CSIRO, South Africa, is using plants to express Newcastle disease virus-like particles for vaccine development.

# *Bridging the career advancement opportunity gap for women researchers in LMICs*

The team at the **International Development Research Centre's Livestock Vaccine Innovation Fund**, our funding partners for the fellowship programme, wrote for the IVVN website about the motivation behind establishing the fellowship scheme.

Women researchers from low- and middle-income countries (LMICs) face a big mentorship opportunity gap. In the 2018 IVVN member survey, nearly half of the women from LMICs who participated listed a lack of mentoring opportunities as one of their greatest professional challenges. In contrast, not a single male respondent from a high-income country reported this to be a challenge (***Figure 1***). This finding motivated the IVVN, in partnership with Canada's International Development Research Centre, to develop a mentoring fellowship programme specifically for female researchers in LMICs.

**Respondents who described a 'lack of mentoring opportunities' as a research barrier or challenge**
(% of respondents in each category)




**International Veterinary Vaccinology Network** members' survey 2018

***Figure 1*** *Respondents who described a lack of mentoring opportunities as a barrier, weighted by gender and by the World Bank income levels of the countries where respondents work (low- and middle income countries, LMICs, and high-income countries, non-LMICs).*

The underrepresentation of women from LMICs in scientific research, especially in senior academic positions, is a consequence of unevenly distributed opportunities for career advancement. In turn, this results in a lack of gender parity and LMIC representation on boards, expert review panels and other forums that influence and shape entire fields of research.

## What is keeping women from LMICs from accessing career advancement opportunities?

Many factors play into the lack of career advancement opportunities, both for researchers in LMICs and for women, and these are compounded for women from LMICs.

Mentoring, especially in a formalised sense, is an infrequent and largely unsupported practice in many LMICs institutions. 'Best practices' for successful mentorship programmes generally do not provide a good template for LMIC institutions, since these are developed for and by high-income country institutions and researchers where opportunities are plentiful; institutions are well-resourced; and a variety of professionals from different backgrounds are trained, supported and rewarded for engaging in mentorship.

In the field of global health research, studies show that in LMICs, few people are available to be good mentors, and potential mentors lack support from their institutions in terms of training and recognition. Young scientists in Africa report that a lack of mentorship opportunities hinders their career progression, and emphasise the need for more guidance on networking, navigating career decisions and applying for funding.

## Young scientists in Africa lack mentorship on fundraising, career decisions and networking

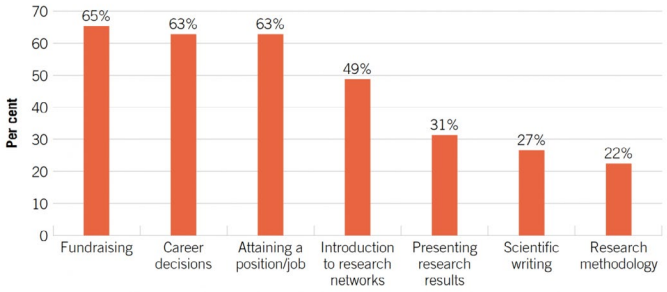



***Figure 2*** *The percentage of scientists ages 39 or younger surveyed by Beaudry, Mouton & Prozesky indicating that they have never or rarely received mentoring on specific issues listed. From "The Next Generation of Scientists in Africa" published in 2018.*

*IVVN Fellowships*

But even where career advancement opportunities are available to researchers in LMICs, their design can discourage the full participation of women. For instance, programmes for early-career scientists with an age cap can exclude women who have taken a few years away from their career to start a family, care for children or engage in caregiving activities that are often relegated to women. Women may also not fully benefit from programmes whose design does not consider sociocultural factors that may influence women's mobility, use of time, or ability to challenge and navigate existing hierarchies.

## The IVVN Fellowship Programme

The recently launched IVVN Fellowship Programme directly addresses the mentorship opportunity gap and aims to provide a boost to the careers of the six female researchers in LMICs who were selected as fellows. Each Fellow can receive up to £50,000 to work on a project that addresses key bottlenecks to developing vaccines against animal diseases. This funding can be used towards the research – for example for laboratory equipment or bench fees – and towards professional development, including attending conferences and workshops, or as a stipend for the fellow.

The fellowship provides meaningful opportunities for international collaboration, which is shown to be an essential ingredient to the success of influential researchers from LMICs. Each fellow receives support from two mentors, one based in a different country and one based in her local institution, who can provide support and advice to guide her research and her career. As part of a cohort, fellows will also have the opportunity to network with one another.

This fellowship, funded in part by the Livestock Vaccine Innovation Fund (LVIF)[1], is part of a set of projects focused on meaningfully increasing women's participation in livestock value chains. Together, these projects focus on empowering women at every node of the livestock vaccine value chain, from livestock keepers and animal service providers in the field, through to the lab and the boardroom.

## Wider benefits

While the fellowship is designed to help early-career female researchers in LMICs to gain experience, build their capacities and advance their careers, the potential benefits extend to their home institutions and to the field of veterinary vaccine science. High-profile researchers increase the visibility of their home institutions, and this "halo effect" can help these institutions achieve global renown for the high-quality research conducted by these researchers.

The promise of the 2030 Sustainable Development Agenda is "Leave no one behind". No country can afford to leave behind half of its population. As more women in LMICs are encouraged and enabled to advance in their careers, they can contribute to shaping the future of the field of veterinary vaccinology, bringing with them a greater diversity of thought and experience. In turn, they may make the field more accessible for a next generation of diverse leaders and experts.

## The International Development Research Centre's Livestock Vaccine Innovation Fund

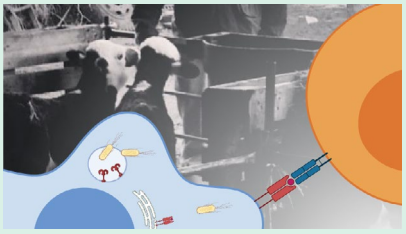

The Livestock Vaccine Innovation Fund (LVIF) supports the development and production of innovative vaccines to improve livestock health and the livelihoods of farmers. This seven-year, CA$57 million partnership seeks to improve the health of livestock and to protect the livelihoods of smallholder farmers. Read more about the LVIF on IDRC's website: idrc.ca/en/initiative/livestock-vaccine-innovation-fund

# Contributed blog posts

The Blog section of the IVVN website is a space for members and organisations that work in veterinary vaccinology to write about their work. This year, we have published four contributed pieces, which are shown below. Thanks to the authors of all four posts for their time and effort in writing them. If you would like to feature your project, organisation or publication on our blog and in our newsletter, get in touch with the IVVN team at IVVN@roslin.ed.ac.uk to discuss.

## Defining a novel immune cell in cattle: the power of meetings

Dr Matthew Edmans, a postdoctoral researcher at the University of Oxford, wrote a blog post for us about his recent publication with other IVVN members, which was published in *Frontiers in Immunology*. The paper identified MAIT cells in cattle and characterised their response to bacterial infections. MAIT cells are a non-conventional T cell population that responds to vitamin metabolites rather than the peptide ligands recognised by conventional T cell populations. Read Matthew's blog post here.



## How Baseimmune's deep learning platform could help develop future-proof vaccines

UK biotech startup Baseimmune is working on designing variant-proof vaccines against African swine fever virus and porcine reproductive and respiratory syndrome virus, based on their deep learning data-driven platform. Their unique platform combines the most recent data in genomics, proteomics and epidemiology with biological expertise, and incorporates this information into antigen discovery and vaccine design, as the team explains here.


## Further funding to enable The Bloomsbury SET to extend its activities to combat infectious diseases and antimicrobial resistance

The Bloomsbury SET is an innovation partnership that brings together universities with a strong reputation for creating enduring impact from their research. With emerging disease at the forefront of global health priorities as never before, they are developing new solutions to combat infectious disease and antimicrobial resistance – read about their work here.

## Notes on the book *Veterinary Vaccines: Principles and Applications*

This year, the Food and Agriculture Organisation of the United Nations (FAO) launched a new book that covers advice and recommendations for vaccine production, quality control, and effective vaccination schemes including vaccine selection, specifications, vaccination programs, vaccine handling in the field, application, failures, and assessment of herd protection. Dr Baptiste Dungu, one of the authors, wrote a blog post introducing the book.