*Together, beyond animal health*

# ECONOMIC & SOCIAL
## REPORT 2022

# CONTENTS


EDITORIAL

## ONE CEVA

NEW HEADQUARTERS

BEYOND COVID

## ONE HEALTH

HUMAN & ANIMAL WELFARE

ZOONOSES

PREVENTATIVE HEALTH AND WELFARE

## ONE PLANET

SUSTAINABLE AGRICULTURE

BIODIVERSITY

EDITORIAL

> Together, our passionate people drive innovative health solutions for all animals contributing to the future of our diverse planet.

# Together, building a more sustainable future

**Looking at the contents of this report, I can't help but feel quite proud of what everyone at Ceva is doing to help build a more sustainable future.**

From the formation of Ceva over 20 years ago, we've been committed to doing the right thing to promote the health and welfare of animals, but on its own this is no longer enough. Today, companies are expected to play an active role in contributing to solve major societal challenges and it is therefore our responsibility to step up and meet these new expectations. Since our last report and following extensive consultation, both within Ceva and with our customers and stakeholders, we established our new business purpose:

**"Together, our passionate people drive innovative health solutions for all animals contributing to the future of our diverse planet."**

Our purpose is designed to be both challenging and inspirational. For example, we don't have all the answers yet as to how we will improve the health of all animals, (including wild animals) but we have set up the Ceva Wildlife Research Fund to finance specific research in this area. As we force wild animals into smaller and smaller areas, the potential for spread of disease increases. With 72% of all emerging human infectious diseases coming from this residual pool of infection in wildlife, we need to act to stop this threat at source. Never has it made more sense to invest in Nature; we can now see clearly our own health and future is interlinked with all the species with which we share the world.

Words written on paper are meaningless, unless you understand how they are more than just words and adopt them as your basis for action. Our new purpose builds on our original "Together, beyond animal health" vision, which in the last decade has driven change in our business. For example, almost half of our portfolio is now made up of preventative health products compared to 25% when we set out. By investing in several projects to preserve biodiversity, in a small way we have helped to save a few of the more than one million plant and animal species at risk. Equally importantly we now have 57 vaccines against zoonoses, covering 19 diseases, including 6 of the 10 most deadly, which together are estimated to cause over 2 million deaths per year.

We can't solve all the world's problems, but together we can create real shared value to make social and environmental progress.

I hope that when you also read this report you will agree that our words are indeed being translated into action.

**Dr. Marc Prikazsky**
**Chairman & CEO - Ceva Santé Animale**

ONE CEVA

## Ceva builds its future Together, from the roots upwards

**Ceva's new Headquarters was inspired by and rooted in Nature, inspired by the simple idea of the tree giving shelter and form.**

The tree draws from its immediate environment, developing its roots from soil and water and then in turn protects its own surroundings. Trees dominate the new site but finally, in the center, there is a clearing where everything converges, a natural setting to house Ceva's new headquarters.

BLP and Associates, who designed the building, were selected from a number of locally-based architectural firms. All were given the brief to produce a headquarters that reflected Ceva's international makeup, yet remained firmly rooted in our local origins.

The new building is designed in the circular shape of Ceva's C-stamp – open on one side to the world but closed to provide security for our employees. 1000 additional, naturally occurring, trees and shrubs will be planted on the 10 hectare site, to enrich the existing woodland that surrounds the natural wetlands.

The eco-friendly construction has been carefully planned from the outset to consider our neighbours, the plants, insects and other animals which share the natural river valley. In line with our commitment to enrich biodiversity as part of Ceva's new business purpose, this will be the first site where we have conducted a full biodiversity audit with an active ecological plan to improve the natural habitats for all species present on the site.

A great example is the care taken with natterjack toads. Forty-two of these rare amphibians, which love the sandy heathland habitat of the river valley, were moved temporarily to a home along the shore of the adjoining lake to minimise disruption to their lives through the construction phase.

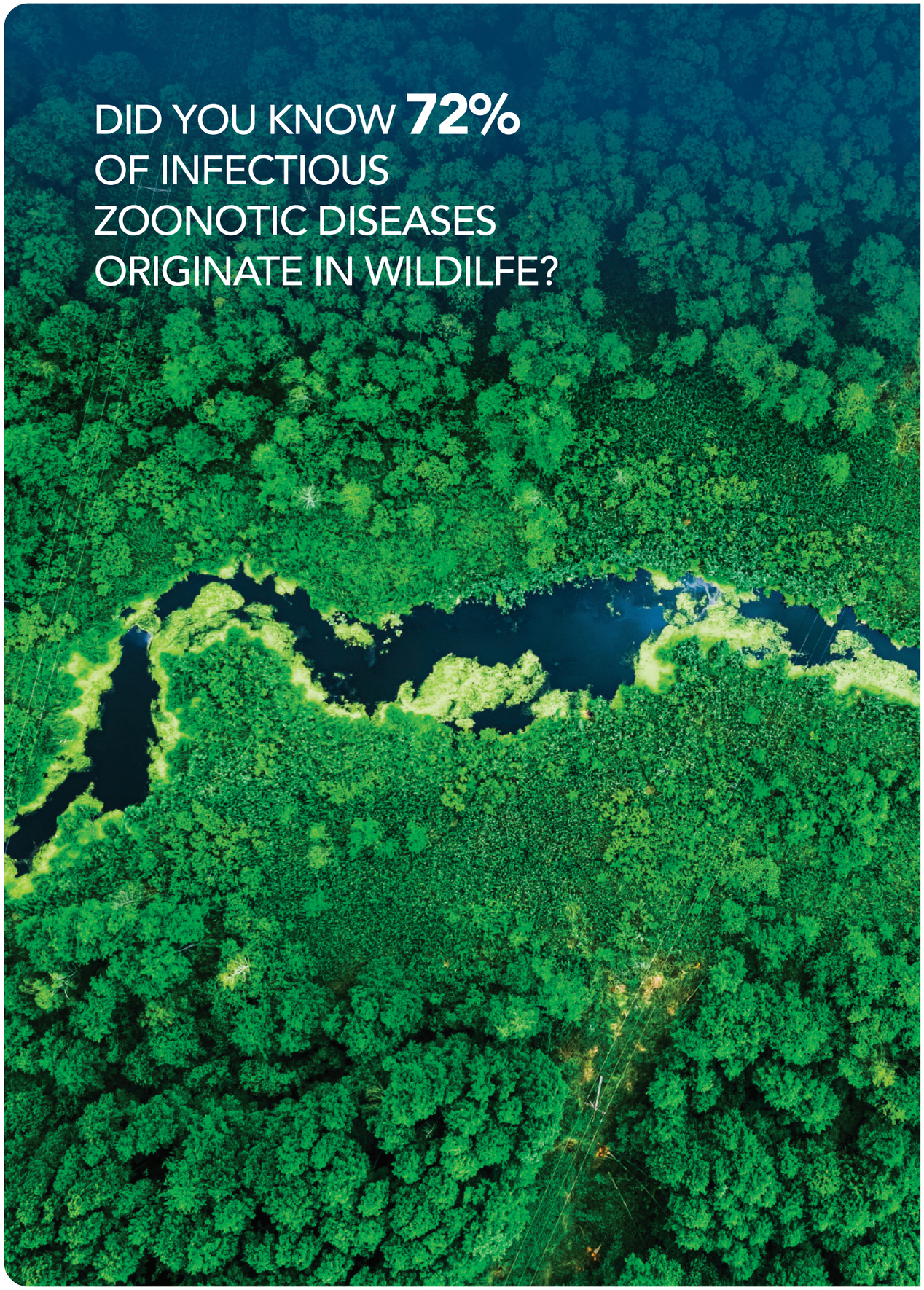
The headquarters have been designed to be energy neutral from the outset and will be certified in this way. Heating and cooling of the building will be provided by geothermal energy, with natural shade from the surrounding planting protecting against the excessive heat that can be experienced in summer. Solar panels will be used as roofing for the car park to ensure that the overall site is more than self-sufficient for all its energy needs. Rainwater will be collected from the "green roof" to water the open lawns surrounding the building.

ONE CEVA - NEW HEADQUARTERS

The interior of the building, as with all Ceva's recent projects, will be co-designed with our employees to ensure they feel a part of and are comfortable in their new surroundings.
Multiple workspaces adapted to everyone's needs, including the ability to work outdoors, will maximise well-being. The emphasis is on comfort: natural light, thermal comfort, sound insulation with a range of freely available cultural and leisure activities.
Eco-friendly travel will be encouraged to access the site, with public transport and electric bikes easily accessible.
In short, the new headquarters is something we can all be proud of, nurturing Ceva employees alongside Nature.

> Ceva is strongly attached to its local roots. Its new headquarters will welcome local and international partners and has been designed to blend aesthetically into its surroundings.
> It will showcase Ceva's activities and promote a strong environmentally-friendly image.

MARC PRIKAZSKY
CHAIRMAN & CEO
CEVA SANTÉ ANIMALE




# Beyond Covid

## A shift from treatment to prevention is enabling animal health to move to One Medicine

*This article is based on a presentation made by Dr. Michael Hemprich, Ceva's Director of Business Development & Strategy, at the 7th annual Animal Health, Nutrition and Technology Innovation Europe event, held in London in February 2022.*

### WHAT'S SHAKESPEARE GOT TO DO WITH ANIMAL OR PREVENTATIVE HEALTH?

Most of Shakespeare's life (1564-1616) was impacted either directly from a health perspective or economically by bubonic plague. Indeed, in the 4 years between 1606 and 1610, London theaters were only open for a total of about 9 months as lockdowns ravaged the London economy.

Of course, London's theatres, in common with those all around the world, went dark once again during the lockdowns of 2020 and 2021; many, it is feared, will never open again.

We now know that the plague that ravaged London in the early 17th century was a serious, infectious disease caused by the bacterium Yersinia pestis and spread by flea bites: flea species that lived on rats switched to humans when infected rat populations died out. But during Shakespeare's time, no-one understood that it was the rats they were living with that were spreading the plague.

### WHAT WILL A POST-COVID ONE MEDICINE HEALTH SYSTEM LOOK LIKE?

Many issues have emerged post-covid with people calling for regeneration to heal a broken planet and fix, for example, our environment and food systems. And yet, health systems and the people that work in them always seem untouchable for public scrutiny, largely because of the profound (and earned) respect the public has for our doctors, nurses and health staff that treat us when we are sick.

Maybe, because I'm a trained veterinarian, I've been convinced for many years that seeing our own health in isolation is a mistake. We need to move to a One Health approach, recognising that the health of people, animals and our environment are fully interlocked. Despite more calls recently for such a move, in reality the movement has so far been a form of 'shotgun wedding' with many human health practitioners seeing no real need to come to the altar.

Yet, with 3 in 4 emerging human infectious diseases coming from animals (and 72% of them from wildlife), it's pretty obvious that to better protect ourselves, we need to treat the cause at source, in the forests of the Congo or Vietnam, not in the hospital beds of London, by when it is often much too late.

As of February 2022, the *SAR-CoV-2 virus* that causes Covid-19 has been confirmed to infect more than a dozen species including pets, zoo animals and free-living wild animals. However, it is likely that infections are more widespread as relatively few species have been tested. If the coronavirus is living and spreading among animals and occasionally jumping back to humans, this process poses threats to public health: the animals can act as a reservoir of infection, even as the number of human infections reduce and, as the virus adapts to the unique characteristics of different species by mutating, new variants can arise that could infect people.

# NO ONE IS SAFE UNTIL WE ARE ALL SAFE

We need a tectonic shift in our thinking about health, realising that we are only a small part of a holistic ecosystem, where we share a pool of diseases with other species, including wild animals - diseases which pass between us and them.

Through the Covid-19 pandemic we've seen endless data, modelling and the fastest roll out of new technology vaccines ever witnessed as governments have struggled to control the disease.

We've also seen the creation of specific One Health bodies, such as here in the UK with the creation of the UK International Coronavirus Network (UK-ICN), which will increase integration of human-veterinary coronaviruses research and innovation.

Let's not forget that at Ceva we've been dealing with another coronavirus, infectious bronchitis (IB) in chickens, for over 30 years now and so have developed interesting knowledge about how to create and use vaccines in the most effective way.

The phrase "no one is safe until we are all safe" has been used many times recently to remind us that as severe acute respiratory syndrome coronavirus 2 *(SARS-CoV-2)* continues to circulate unchecked anywhere in the world, the opportunity for new variants to arise is still present. But what about the animals that were probably at the origin of this pandemic? How do we vaccinate bats deep in their caves?

Trying to stamp out such a globally dominant disease one country or outbreak at a time does not work. It's like playing 'whack a mole'.

## PREVENTION BETTER THAN CURE AND MORE COST EFFECTIVE

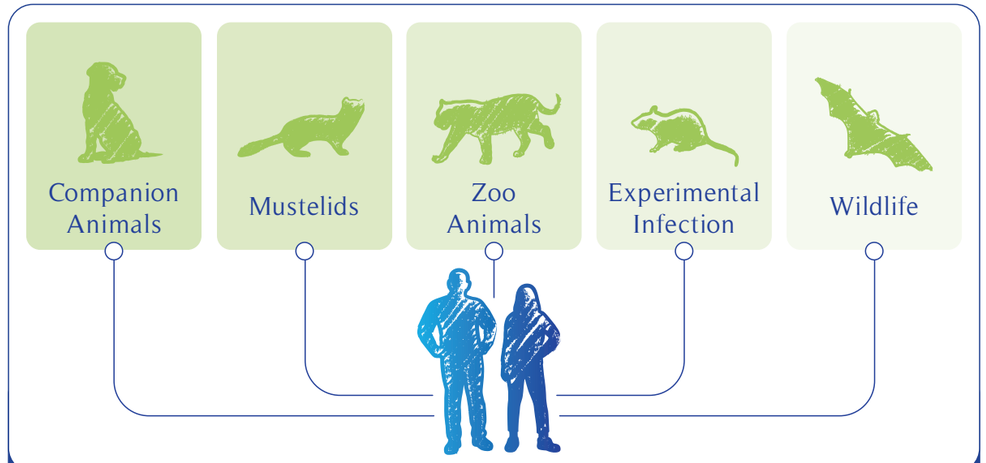
A recent paper [1]published in the respected journal Science Advances estimated the cost of implementing effective primary pandemic prevention, which would entail better surveillance of pathogen spillover and development of global databases of virus genomics and serology, better management of wildlife trade, and substantial reduction of deforestation.

These measures were designed to address the fact that *'Humans have extensive contact with wildlife known to harbor vast numbers of viruses, many of which have not yet spilled into humans',* and, the authors suggested, represent an improvement to the current approach to pandemics, which boiled down to taking action only after people get sick.





## NATURAL AND EXPERIMENTAL SARS-COV-2 INFECTION IN DOMESTIC AND WILD ANIMALS




**Naturally Infected:** cat, dog, ferret, lion, tiger, snow leopard, puma, fishing cat, lynx, coati, binturong, mink, white tailed, deer, hippo
**Experimentally Infected:** hamster, mouse, primates, ferret, cat, treeshrew

They found that the cost of these preventive actions, estimated at USD 20 billion a year, was small in comparison to the estimated value of lives lost to emerging viral zoonoses, conservatively estimated at USD 350 billion a year, and an additional USD 212 billion in direct economic losses.

The paper points out that these preventive approaches also came with substantial co-benefits, including helping to avoid carbon dioxide emissions, conserving water supplies, protecting indigenous peoples' rights and conserving biodiversity.

We've seen similar reactive rather than preventive strategies fail for avian influenza and African swine fever in the veterinary sector; ultimately no frontiers, walls or fences can stop their spread.

Take for example human flu control in Europe. Many scientists advise that people should be vaccinated, even with a vaccine that is 60-70% efficacious, and that is great advice. But we also know, through our work with the International Swine Flu Network, that flu strains are also endemic in pigs, including pandemic strains that can spill over from swine to people, which they do, all year round.

So, to stop clinical disease and prevent the rise of potentially disastrous new variants in order to stop the next pandemic, we should be calling for the vaccination of pigs as well. But who is doing that?

It's not a question of efficacy, as was erroneously suggested in an otherwise excellent article[2] in the Scientist looking at the origins of the swine flu pandemic in 2009. The real problem with flu vaccines for pigs isn't the fast pace of evolving strains, as the authors suggest, but the reluctance of vets and farmers to implement and invest in the recommended vaccination scheme.

This requires two initial doses for both sows and their offspring followed by booster vaccination every 4 months for sows. Many vets and farmers regard this as being too costly and time consuming – but if it's going to help prevent the next flu pandemic in Europe, shouldn't EU states be considering sharing some of the costs?

Aside from the question of money, a shift to prevention first, with reinforcement of surveillance and emergency preparedness, is therefore essential. Fortunately, recently there have been some positive moves in this direction.

## WE'VE SEEN SIMILAR STRATEGIES FAIL FOR AVIAN INFLUENZA AND AFRICAN SWINE FEVER IN THE VETERINARY SECTOR


At the global level, on 30 March 2021, leaders from all around the world joined the President of the European Council, Charles Michel and the Director-General of the World Health Organization, Dr Tedros Adhanom Ghebreyesus in an open call for an international treaty on pandemics[3], drawing from the lessons learnt during the *COVID-19* pandemic. In a joint call for the treaty they stated:

*"There will be other pandemics and other major health emergencies. The question is not if, but when. Together, we must be better prepared to predict, prevent, detect, assess and effectively respond to pandemics in a highly coordinated fashion. To that end, we believe that nations should work together towards a new international treaty for pandemic preparedness and response."*

**Charles Michel**, PRESIDENT OF THE EUROPEAN COUNCIL
**Dr Tedros Adhanom Ghebreyesus**, DIRECTOR-GENERAL OF THE WORLD HEALTH ORGANIZATION





## CEVA, COMMITTED TO PREVENTIVE APPROACHES


Also, the French government promoted the creation and adoption of PREZODE *(Preventing Zoonotic Disease Emergence)* at the G7 summit held in June 2022.

This is an innovative international initiative to understand the risks of emerging zoonotic diseases, to develop and implement innovative methods to improve prevention, early detection and resilience in order to ensure rapid response to the risks of emerging infectious diseases of animal origin.

We at Ceva are very happy to partner with CIRAD and other public sector actors, to play our part in this important programme.

As part of our new business purpose initiative, we have also created the Ceva Wildlife Research Fund that will focus specifically on understanding how we can better prevent diseases in wildlife, the major reservoir of emerging infectious diseases, to improve their health (and chances of survival) and help better protect our own.

Covid-19 has demonstrated that many future generations will continue to pay, so will we now have the courage to learn the lessons and change our approach to health? Shakespeare's generation wasn't aware what was causing the 'fires'. We are, even if we don't know exactly where the next one will flare up. There is no excuse not to be prepared.

*[1] https://www.science.org/doi/10.1126/sciadv.abl4183*

*[2] https://www.the-scientist.com/news-opinion/the-long-journey-to-resolve-the-origins-of-a-previous-pandemic-69141*

*[3] https://www.consilium.europa.eu/en/policies/coronavirus/pandemic-treaty/*

> Ceva's Chairman & CEO Marc Prikazsky, who like many other managers at Ceva is a trained veterinarian, likened the company to a fire brigade in his analogy made more than 10 years ago in the paper "World Health at Stake, Who Cares, Who Pays?

MARC PRIKAZSKY
CHAIRMAN & CEO
CEVA SANTÉ ANIMALE

# WORLD HEALTH AT STAKE, WHO CARES, WHO PAYS?

"It's like being a fire brigade. If they are called early enough, then they can rush and put the fire out before too much damage is done. That is the emergency response mode. For emergency response to be effective, you need proper monitoring and information systems, 011 (or similar) emergency call numbers, quick access to fire hydrants nearby, and the right equipment. The less these elements are in place, the longer it takes to put out the fire, and the more damage it will do.

In this analogy we would consider ourselves the makers of some of the firefighting equipment: we know what sort of techniques, materials and pumping systems will put out what kind of fire. Currently we are usually asked to provide these while a fire is in full blaze. But there could be another mode – prevention. Ceva's knowledge about fires could be better engaged in preventing fires from breaking out – contributing our knowledge towards influencing the building codes, prohibiting risky behavior, isolating potential sources of fire, stocking hydrants, creating evacuation plans, and more.

Ceva management believes firmly that prevention-mode and emergency-response facilitation could and should still be improved – especially when considering this in terms of costs that could be reduced or prevented by tackling animal diseases before they cause widespread damage. With better prevention and better emergency response, the global health system would be spending only a fraction of the cost of what the economic damages of these uncontained diseases are today."

*Marc Prikazsky - CEO Ceva Santé Animale*



ONE HEALTH

# Human-animal bond & welfare

## Balancing the health and welfare of people and animals in human-animal interactions

**An increasing number of scientific studies have shown that human-animal interactions can help reduce anxiety, depression and loneliness and have beneficial impacts on blood pressure, heart rate and a number of hormones that regulate mental health.**

During the Covid-19 pandemic, which elevated stress levels for billions of people worldwide, many people turned to nature and animals for solace.

In the UK, an additional 3.2 million households have acquired a new pet since the start of the pandemic. Now, there are 34 million pets in the UK with 17 million households (6 out of 10) caring for one or more dog, cat, small mammal, bird, reptile or fish. Three-quarters of the new pet owners, most of whom are 16-34 year-olds, reported that pets helped their mental health.

However, this rapid increase in pet ownership has raised concerns amongst animal welfare charities. Already, 5% of new pet owners have parted with their recently acquired animals.

RSPCA pet welfare expert Dr Samantha Gaines said:

*"As these figures demonstrate, a huge number of people have added a new pet to their family during lockdown while other pet owners have made the most of spending more time at home during the pandemic to enjoy the company of their pets."*
*Many of our pets are now used to having us around all the time while others have never known any different so we have real concerns that life post-lockdown, both in terms of a new routine and spending time alone, could be really difficult for them to adjust to which is why it's so important that owners start to prepare them now. In the absence of this preparation, pets could be facing their own crisis."*

This raises an important issue that affects all interactions between people and animals – how can the welfare and wellbeing of both people and animals be assured?

ONE HEALTH
HUMAN ANIMAL BOND & WELFARE

# CEVA WORKS WITH GLOBAL PARTNERS SO EVERYONE – YOUNG AND OLD - CAN BENEFIT FROM THE HUMAN-ANIMAL BOND

The bond between humans and animals goes back thousands of years when hunter-gathers relied on animals primarily for resources such as meat, bones and hides – such as when they scavenged kills made by wolves. The relationship soon grew as early humans began to assign human characteristics to animals and started to include them in cultural ceremonies through worship, sacrifice and symbolism in art. Later, early humans discovered that some species could be tamed, leading to domestication – initially for utilitarian purposes (food, protection and assistance with hunting), but later for companionship too.

In 1984, the American ecologist E.O. Wilson introduced his biophilia hypothesis, which he defined as the human inclination to fixate on various aspects of natural life, including emotional attachments to living beings and nature. Some scholars have suggested an evolutionary perspective to explain this: early humans who had stronger connections to nature might have an advantage over less connected people as they would have better knowledge about and access to food, water and shelter.

The Human Animal Bond Research Institute (HABRI), which is supported by Ceva, defines the human-animal bond as "a mutually beneficial and dynamic relationship between people and animals that is influenced by behaviors that are essential to the health and well-being of both."

Today, modern humans have complex emotional, psychological and physical connections with a wide range of animal species – ranging from farm animals kept for food, through working animals such as equines kept for transport or medical detection dogs, to pets – especially dogs and cats – kept primarily for companionship.

Below, Ceva's partnerships with individuals and organisations working to ensure that both the young and the old can benefit from the human-animal bond are described.

# EXPLORING THE RELATIONSHIP BETWEEN PARENTS, PETS AND WELLBEING OF CHILDREN

**Many experts agree that companion animals can be beneficial to human wellbeing, and there is considerable anecdotal evidence to support this idea. High-quality, peer-reviewed science in this area is, however, largely lacking. This makes it difficult to develop effective evidence-based policies, best practices and guidelines for organisations and individuals working in the field of animal-assisted interventions.**

Sound policies and guidance are vital to ensure animal-assisted interventions – ranging from fully-trained assistance animals to family pets – respect the wellbeing of both humans and animals, and deliver maximum benefits. A sound evidence base is also crucial if public health agencies and other organisations are to be convinced to allocate scarce resources to animal-assisted interventions over other options.

As part of its ongoing support to the International Association of Human-Animal Interaction Organizations (IAHAIO), Ceva is continuing to support innovative research to help enhance the science around the human-animal bond. It particularly focuses on how pets can improve the wellbeing of children and young people, including those living with mental health challenges. Earlier support from Ceva helped to shed light on a mechanism (synchrony [1]) that may underlie the effect of dog-assisted therapy and how this makes a difference for children with autism spectrum disorder and Down syndrome [2].

The latest PhD researcher to be supported by Ceva is Danielle Groenewoud, an experienced clinical psychologist, who is comparing the nature of the bond between youngsters aged 8-14 years with their pets and also with their parents.

In her clinical work with adolescents with depression or anxiety, Danielle is used to working with the whole family – parents and siblings, and often pets too. She realised, however, that 20-years ago, when she trained, there was nothing in the curriculum about the human-animal bond and, even now, this topic receives only scant coverage.

During a recent sabbatical year, she reviewed the literature on the attachment bond between children and animals and discovered that very little research had been done. So, under the guidance of Professor Marie-Jose Enders, president of IAHAIO, and with financial support from Ceva, she is now working on a PhD with the objective of seeing if the attachment bond between children and their cats and dogs is comparable to that between children and their parents.

As Danielle explained during a recent interview for Ceva tv:

*"Attachment bonds, such as those between children and their parents, can be classified as secure or insecure. Secure bonds are associated with better social and emotional wellbeing, while insecure bonds, which can be described as anxious, disorganised or avoidance, are risk factors for developing psycho-social health problems such as anxiety, low quality of life and problems with emotional regulation. We know that secure attachment to pets can have a positive effect on wellbeing of adults but we don't know if this also holds for children."*

Now in the second year of her PhD, Danielle has completed a systematic review of relevant peer-reviewed publications, which has revealed some contradictory results. She is currently fine-tuning the design for her own study, which will focus on children and adolescents aged 8-14 years. Using carefully designed questionnaires, she will gather data on attachment to pets and parents and the correlation with social-emotional wellbeing and emotional regulation.

The aim is to answer the questions: is attachment to parents the same as to pets, and is attachment to pets associated with wellbeing of children?

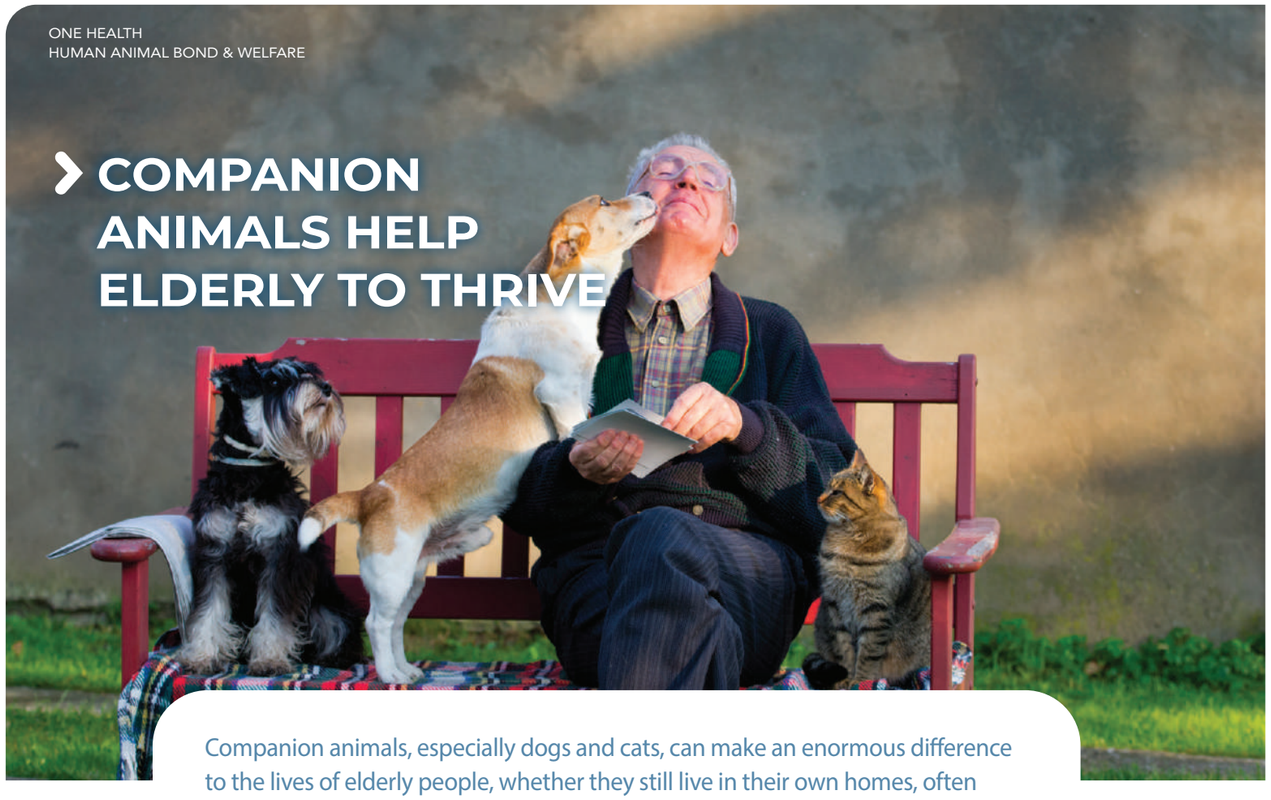
Commenting on this research, Danielle explained that she had purposefully chosen children in the 8-14 years age range because they experience big transitions in their lives: transitioning from children to teenagers; changing school; and experiencing a widening attachment network with a shift in focus from parents to peers.

*"As 30-40% of children in the West have insecure attachment bonds with one or both of their parents, it will fascinating to see whether secure attachments with pets can have beneficial impacts on these children."*

## What is attachment?

British psychologist John Bowlby, a pioneer in this field working in the second half of the 20th century, described attachment as a "lasting psychological connectedness between human beings". In brief, his attachment theory states that that primary caregivers (usually parents) who are available and responsive to an infant's needs allow the child to develop a sense of security. The infant learns that the caregiver is dependable, which creates a secure base for the child to then explore the world. Bowlby believed that the earliest bonds formed by children with their caregivers have a tremendous impact that continues throughout life.

*(1) the coordination of behaviour between the child and the dog.*
*(2) https://pubmed.ncbi.nlm.nih.gov/31809563/*



# COMPANION ANIMALS HELP ELDERLY TO THRIVE

Companion animals, especially dogs and cats, can make an enormous difference to the lives of elderly people, whether they still live in their own homes, often alone, or have taken up residence in a care home. Although not all elderly people can currently benefit from the companionship of animals, several dedicated organisations and volunteers are determined to help make sure this vital bond contributes to the wellbeing of both people and animals.

Europe has a rapidly aging population with the highest growth rates in the very elderly. Between 2019 and 2050, the number of people 85 years of age and above in 27 EU countries is projected to more than double to 26.8 million and the number of centurions will more than quadruple to almost half a million. This inevitably means that larger numbers of elderly people will require assistance, either in their own homes or care homes, and they will tend to require this assistance for longer.

Most people's perception of care homes for the elderly are not positive: the stereotypical picture is one of bored people sitting around in dull institutional settings with little to do.

In the early 1990s, Bill Thomas, an American doctor, was working in a US care home. He decided that the lives of the elderly residents could be much more fulfilling; the facilities they lived in did not need to be sterile, rigid place where they went to wait to die.

He proposed a radical alternative to the medical model that almost all such homes then followed. He suggested that these facilities are primarily homes, not hospitals, and they should adopt a 'human habitat' model. This meant that the residents' lives should be enriched in various ways, including by being surrounded by animals and plants, and having daily activities with children. Overall, he aimed to banish what he considered to be the three major curses afflicting the lives of care home residents: loneliness, helplessness and boredom.

Professor Thomas called his new model the Eden Alternative. Almost twenty-five years on, the Eden Alternative has been adopted and put into practice in progressive care homes for the elderly throughout the world.

The philosophy behind the Eden Alternative's use of animals in care homes is that biological diversity is as good for human habitats as it is for natural habitats. So, a wide range of animals, including dogs, cats, rabbits, hamsters, caged birds and fish, transform care homes into diverse, vibrant places to live. Some animals, such as dogs, cats and fish, are shared by all the residents while others, such as small caged birds, are offered to residents to be kept in their rooms. The latter enjoy the sense of ownership and responsibility, as well as the companionship and interest they derive from their roommates. In brief, in Eden Alternative homes, frail elderly adults live in diverse and stimulating human habitats that enable them to thrive due to their positive interactions with people and animals that provide companionship, diversity, variety, spontaneity and mutual interactions.

In France, in 2018, a new charity, TERPTA, was established to develop and pilot a different approach to the challenge of enabling elderly people to continue to enjoy the companionship of their pets after they move into care homes. The charity entered into an agreement with a care home to construct a chalet-style building in the grounds. The chalet was then staffed with volunteers and young people from the National Civic Service. Cats and dogs belonging to elderly people moving into the care home were housed and looked after in the chalet. The pets' owners and other care home residents were free to visit the animals during the day. Not only did this enable them to keep in close contact with their pets but it also encouraged greater interaction between the residents. The TERPTA approach is still at the pilot stage but fund raising is underway to enable the approach to be scaled up. Ceva provided support to TERPTA during its pilot phase[3] and continues to work with the charity as they refine their model.

In 2017, the results of a survey conducted in the UK and funded by the government was published that set out to answer the question: Life in a care home, what's it really like? Although the majority of residents and relatives considered that the care they received was good, more than a third of facilities were found to have environments with 'paper peeling off the walls, [and] dead plants littering communal spaces' and almost a quarter of respondents felt strongly that they needed more or better activities.

ONE HEALTH
HUMAN ANIMAL BOND & WELFARE

Professor Marie-Jose Enders, President of IAHAIO (International Association of Human-Animal Interaction Organizations) talked about her experience of dogs and cats in care homes during a recent interview for Ceva TV:

***"[Here in the Netherlands] we see that having animals in a nursing home works very well – without zoonoses, without allergies, without problem of falling."***

Professor Marie-Jose Enders
PRESIDENT OF IAHAIO

**Noudje Van Bussel, Director of Oudenlandgoed Grootenhout – a care home for the elderly with dementia in Putten, The Netherlands which encourages residents to bring their dogs and cats with them and allows them to roam freely throughout communal areas, added:**

"When people have a dog and they come here it's a very big issue because one of the big things they are frightened of is that they have to leave their animals behind. In order to get them started [here], together with the animal it's much more easy because they love the animal and they can have comfort from the animal."

Noudje Van Bussel
DIRECTOR OF OUDENLANDGOED GROOTENHOUT

A number of surveys of care home staff and management have also been undertaken in the US and Europe. While these tend to find that the presence of animals in care homes is considered beneficial to the residents' wellbeing, there are concerns over health and safety issues, and most homes do not have clear policies in place covering this topic. As a result, often the presence of dogs, cats and other animals in care homes is dependent on the goodwill of staff and relatives.

Making the decision to leave one's home, filled with a lifetime of memories, to take up residence in a care home can be a very distressing experience for many elderly people. For the 25% of older people who own pets the decision is especially hard as many care homes do not allow them to bring their pets with them. In some cases these animals can be passed on to younger family members but often there is no choice but to hand them over to animal shelters, where their prospects are often grim, or have them euthanized. Many elderly people, whose health, safety and general wellbeing would benefit from moving to a care home, refuse to make the shift because they cannot bare to be parted from their cherished pets.

In 1985, the Cinnamon Trust was established to address this dilemma in the UK. Today the charity's 18,000 volunteers help over 150,000 elderly people a year by providing practical hands-on help with their pets. So, for example, volunteers are assigned to elderly dog owners who can no longer exercise their pets. The volunteers take over this role, visiting regularly to ensure the dogs get the daily walks they need and their elderly owners also benefit from interaction with other people. In other cases, volunteers will clean out bird cages or fetch heavy cat food from the shop. If the pets' owners need to go into hospital for a brief stay, short-term foster care is provided, with the owner being provided with regular updates on how their pets are faring and even visits where possible.

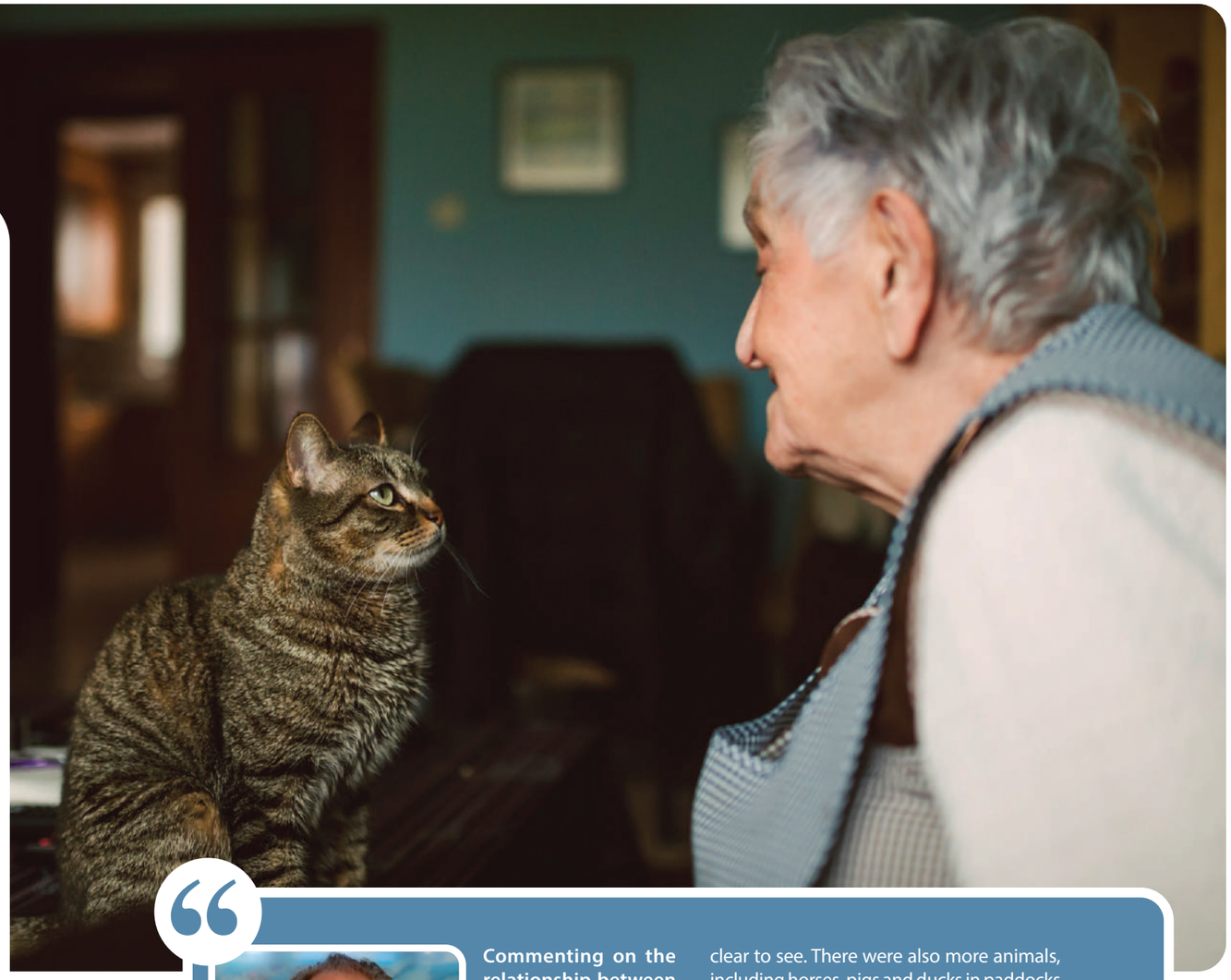
And if staying at home is no longer possible, the Trust maintains a Pet Friendly Care Home register which lists care homes and retirement housing that are happy to welcome pets along with their owners. Finally, to provide owners with peace of mind, arrangements can be put in place to provide life-time care for pets whose owners have died. In these various ways, the Trust meets its primary objective to respect and preserve the treasured relationship between owners and their pets.

An increasing number of elderly households face a slightly different problem associated with aging where one partner of a couple develop early-stage dementia. The UK charity Dogs for Good – which Ceva has supported for several years - has a program which targets older people living with this challenging and stressful condition.

Dogs for Good initiatives include placing fully-trained assistance dogs with elderly couples, one of whom has early-stage dementia, as well as activities that use 'community dogs'. The latter are highly trained dogs that work in a range of community settings. Together with their handlers these dogs undertake a range of specific dog-assisted interventions, such as visiting people living with dementia in their homes to encourage their creativity or sharing of memories, motivating them to get out to exercise and engage in day-to-day activities, or bring people together to take part in 'Dog Days' events.

Dog Days are regular social events open to people with all stages of dementia which enable those who attend to interact with the dogs and also the other people present around a series of themed dog activities. Interactions with dogs have been shown to bring a number of benefits to people living with dementia including stimulating conversation, connection and reminiscing, interrupting negative thought patterns, engaging in purposeful activity and reducing anxiety, and simply bringing joy.

*(3) https://www.ceva.com/responsability/gracefully-growing-old-together/*



**Commenting on the relationship between elderly people and their pets, Martin Mitchell, Ceva's Chief Sustainability Officer:**

"At Ceva we are passionate about the human-animal bond. I have seen for myself the difference that being surrounded by animals and nature can make in the lives of elderly people – most recently when I visited two care homes for the elderly in the Netherlands. There elderly people living with dementia and their pets mixed freely throughout the home and the positive impact this had on the lives of the residents was clear to see. There were also more animals, including horses, pigs and ducks in paddocks around the home, encouraging the residents to venture outside. The whole atmosphere was totally different to the sterile, institutional aura of many traditional care homes.

There has been relatively little research done in this area and there is also a lack of best-practice guidance to help staff and management of care homes develop sound policy and practice. With a rapidly growing elderly population this is an issue that demands more attention. At Ceva, we will continue to promote the science behind understanding how we can help our elderly (with or without dementia) to be happy in environments where they have free access to animals and nature."


©Dog For Good

# DOGS FOR GOOD

Dogs for Good is a UK charity, supported by Ceva, that brings trained dogs and people together to help them overcome specific challenges, in order to enrich and improve the lives of both. The charity puts the health and wellbeing of its dogs is at the heart of all they do - it is a key guiding principle for their work and one of their core values.

Dogs for Good is an accredited assistance dog provider and therefore, as a minimum, conforms to the standards of practice of Assistance Dogs International (ADI) ). ADI is a worldwide coalition of non-profit programs that train and place assistance dogs and fosters a collaborative global community dedicated to the highest standards of excellence for the assistance dog industry.

Dogs for Good is also a founder member of Animal Assisted Intervention International (AAII) and therefore also supports and upholds AAII's global standards of practice.

In addition to being concerned for the welfare of trained assistance and support dogs involved in their work with people living with physical or mental challenges, families with children with autism, and spouses with a partner with dementia, Dogs for Good has also taken action to help ordinary dog owners ensure their pets are happy and healthy.

With support from Ceva and a team of canine experts, Dogs for Good has developed a comprehensive and searchable on-line resource called Take the Lead[4]. This aims to provide good advice to empower every dog owner to have a happy, rewarding relationship with their four-legged friend. It includes practical exercises, theory and videos covering topics such as health, preparing for a dog, puppy care, teaching your dog, understanding dog behaviour and wellbeing which covers various aspects of keeping dogs safe and minimising stress, such as separation anxiety.

"Training assistance dogs is a time-consuming, complicated and highly skilled activity, particularly when any scale is involved. Nevertheless, few national governments have clear standards or regulate assistance dog training work, which is why ADI decided many years ago to do something about that to protect the interests of people and dogs. ADI has created a clear set of standards, agreed by the 190 member organisations and regularly reviewed, that ensure the needs of the dogs and the clients we support are met. The ADI standards create a brilliant framework for us and cover all key areas including training, dog welfare and wellbeing, client support, administrative support and governance. Clients getting a dog from an accredited member of ADI, such as Dogs for Good, can be assured that they will get the right support and training to ensure they can build a thriving partnership with their dog."

**Peter Gorbing**
FORMER CEO DOGS FOR GOOD AND ALSO VICE-CHAIR OF ASSISTANCE DOGS INTERNATIONAL

*(4) https://www.dogsforgood.org/good-advice*





# TRAINED THERAPY DOGS IN SCHOOL IMPROVE OUTCOMES FOR CHILDREN

A new study, sponsored by Ceva, has provided evidence that trained social therapy dogs in schools can bring about better health and educational outcomes for children, especially autistic children and those experiencing bullying. These benefits could also be associated with large potential economic benefits for society.

The study was carried out in Sweden and the findings were shared at a special session of the 2021 Uppsala Health Summit, also sponsored by Ceva, that focused on the benefits of animal-assisted interventions on wellbeing of children facing mental health challenges in schools.

Held annually since 2014, the Uppsala Health Summits are invitation only events which bring together leaders from academia, industry, governments and civil society to discuss practical solutions that can lead to better health outcomes globally. The theme for 2021 was 'Pathways to Lifelong Mental Wellbeing'. Including animal-assisted interventions in the program for 2021 for this prestigious event shows how this approach is gaining traction and recognition amongst leading human health professionals.

The recent study was based on a survey involving 70 teachers in Swedish schools who used therapy dogs. All 70 respondents reported successes. Not only did the mental health of their pupils benefit but the sessions with dogs also encouraged pupils to stay in school so they could leave with adequate grades to continue to high school and higher education, or to get jobs.

Earlier work has shown that enabling children who face mental health challenges at school to go on to become self-sufficient adults delivers huge societal benefits. For every year a young person delays embarking on their working life, the cost to society has been estimated at €50,000, while those who never enter the world of work can cost society €1 million over their life-time. Children who drop out of schools are also much more likely to become involved in criminal activities.

Compared to these large potential costs and risks, the cost of providing social therapy dogs to schools is low: in Sweden it costs around €3,000 to train a dog and the ongoing cost to the school is low as handlers either work as volunteers or for minimal fees.

Despite this, recently a number of animal-assisted interventions in Nordic schools have been discontinued on cost grounds. Although decision-makers are increasingly aware of the health and wellbeing benefits that assistance dogs can deliver, they now need to be made aware that dogs can also provide tangible economic benefits and represent value for money.

"If you're a politician, you have to hear about this because the preventive work that we do, when we see and meet children in schools, they actually benefit from that when they are teenagers, because they have grades and they manage to make a work career and pay back to society."

**Sarah Karlberg**
CEO OF THE SWEDISH DOG THERAPY SCHOOL

ONE HEALTH
HUMAN ANIMAL BOND & WELFARE

# UPDATES ON CEVA-SUPPORTED ANIMAL-ASSISTED INTERVENTION PARTNERSHIPS

**Ceva was delighted to once again sponsor the Assistance Dogs International (ADI) hybrid 2022 Conference.** ADI's annual conference is the premier event connecting a worldwide coalition of non-profit programs that train and place assistance dogs. Held in September 2022, the conference theme was **"Moving Forward Together,"** reflecting a renewed focus on the welfare of dogs and people.

A previous Economic & Social Report featured **Richard Griffioen's research for his PhD, sponsored by Ceva. This increased understanding of synchrony**, that is the mirroring by children with Down syndrome or who are on the autistic spectrum of movements of animals, especially dogs, during animal-assisted intervention sessions. Synchrony is believed to partly explain the mechanism whereby animal-assisted interventions can have beneficial impacts on these children, such as by reducing stress and improving communication skills. Richard's thesis, Children and Animals in Synchrony, has now been published and this has led to him being appointed professor of animal-assisted interventions at AERES University of Applied Sciences, Netherlands.

**Assistance Dogs Australia** (ADA) celebrated its 25th anniversary in 2021. Ceva has already sponsored the training of two puppies by ADA and is exploring ways to expand its relationship with the charity.

Through its **Ceva Laval campus in northwest France, Ceva has recently increased its support for Handi'Chiens**. Since 1989, Handi'Chiens has been training and providing assistance dogs, free of charge, to vulnerable children and adults who need them. This includes assistance dogs for children and adults with motor disabilities and/or suffering from developmental behavioural disorders such as autism; emotional support dogs for care institutions for dependent people; and seizure alert dogs trained to accompany epileptics.

Meanwhile, Ceva employees have been supporting the **Alienor Sud Ouest guide-dog school in Bordeaux.** Ceva has also recently brough together French and Swedish animal-assisted intervention initiatives to enable them to share experiences and learn from each other.

©iCatCare_Ana-Coscujuela-Vigo

# CEVA SPONSORSHIP HELPS SPREAD EXPERTISE TO IMPROVE WELFARE OF UNOWNED CATS

Half the world's 600 million domestic cats are unowned and many have tough lives. The charity International Cat Care (iCatCare) has created Cat Friendly Solutions for Unowned Cats to support those who work on the front line in helping unowned cats with information and guidance all in one place. It has been carefully collated, gathering together iCatCare's feline expertise and great things from other organisations working with unowned cats.

Unowned cats include those that are born and live on the streets as well as those which previously lived in homes but for various reasons have become lost, abandoned or strayed, all of which require some care.
In 2022, Ceva sponsored a Portuguese animal welfare association to enable their president to participate in iCatCare's online 'Becoming a Cat Friendly Homing Centre Programme'. Without Ceva's support, the Associação Miacis - Protecção e Integração Animal (Miacis for short) would not have been able to afford to access this valuable learning opportunity.

António Manuel Silva, president of Miacis, started the 20-week intensive programme in February 2022. This transformational programme aims to support participants to adapt their way of working following Cat Friendly Homing principles. It is a coach-supported programme that enables the participant organisations to adapt their activity to suit their own organisation.






©Miacis - *'Mother's lap is the best place in the world' and 'We evolve, protecting them'*

Miacis is a voluntary, not-for-profit, legally registered Portuguese animal welfare association founded in July of 2013. The founders were a group of volunteers with a significant amount of experience in animal protection and welfare. Its main aim is to promote the control of the reproduction of at risk cats and dogs, as well as their well-being and social integration.

A major focus is the implementation of trap, neuter, return programmes for cats and dogs that do not appreciate human contact, but the association also organises adoption of suitable animals to for-ever homes. Since Miacis started they have promoted the neutering of more than 10,000 animals and homed more than 1,000.

All the work at Miacis is voluntary and they do not own or rent any facilities. The majority of their activities take place in the metropolitan area of Porto where their volunteers live and work. The animals they care for are kept in volunteers' houses while they need care, and in special cases they use foster families or boarding catteries for longer stays.

António has been following iCatCare for many years and has always tried to pass on to his colleagues the valuable information and advice he gets from iCatCare publications. He applied for sponsorship for this programme because he thought that it would be a tremendous opportunity for many of his team to learn even more.

Vicky Halls, Project Manager - Cat Friendly Homing at iCatCare explained: "Due to the nature of Miacis, the number of cats they home every year is not very high, but the cases they deal with are quite complex. Our decision-making process about the best option for each cat, a key feature of the Cat Friendly Homing programme, will benefit the cats in their care and give their volunteers confidence to make those decisions. This will create a foundation that will benefit cats for years to come. António is doing really well and is one of the star performers on the programme!"

A key principle of iCatCare's Cat Friendly Homing programme is that only cats which are suitable to live as pets should go through the homing process. Cats obviously not suited to homing as pets, such as feral, street and community cats, should be found alternative solutions using the trap, neuter and return approach.

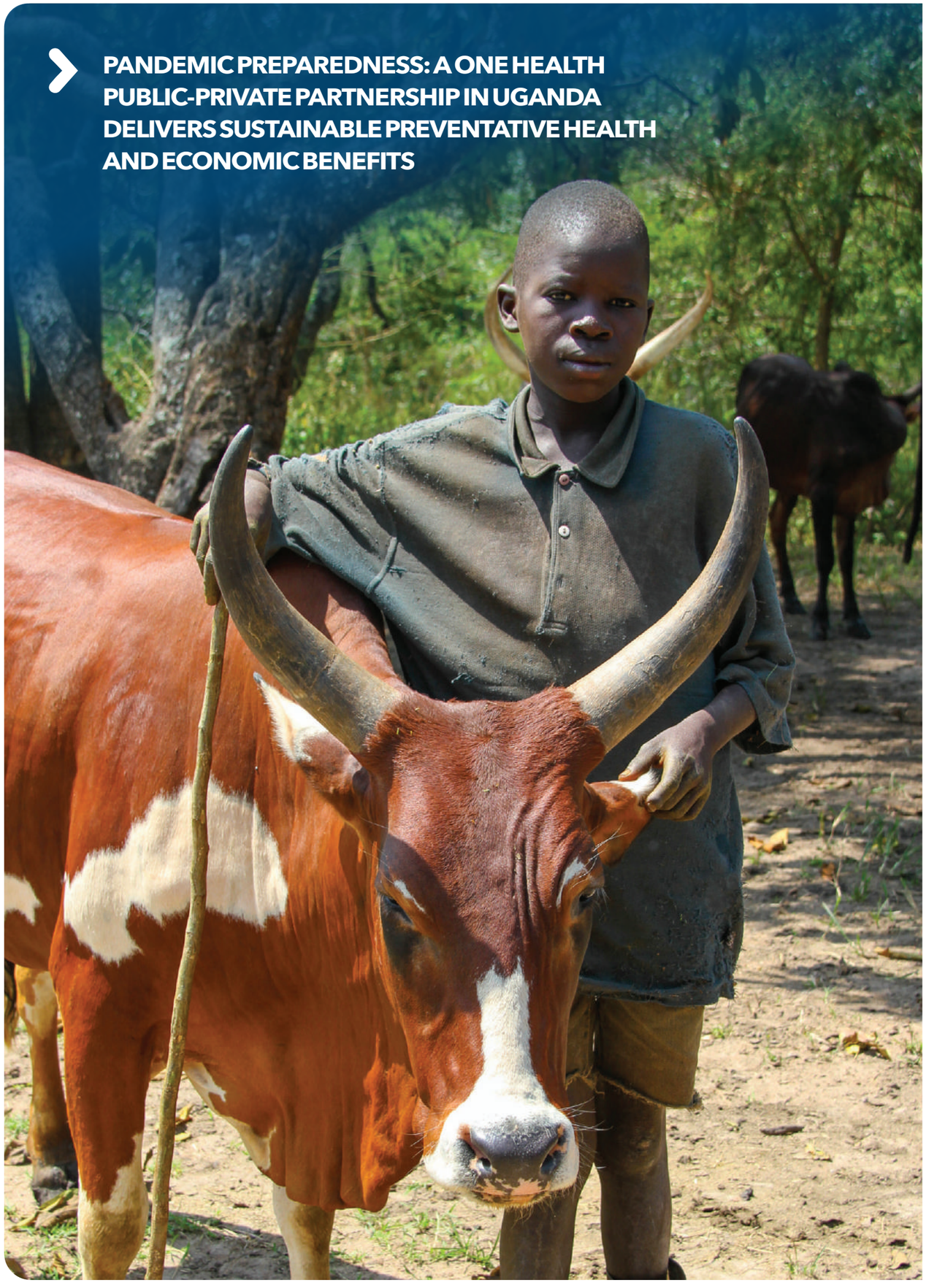
**The three key areas that the Cat Friendly Homing programme covers are:**

- **Intake – admit wisely**
- **Care – respect the species; know the individual**
- **Outcome – meet the needs of the individual.**

"As part of our new business purpose we committed to help care for all animals, including those that have no-one to care for them. The web is full of images of beautiful cats with their owners, but by focusing on unowned cats who are often forgotten, ICC is bringing valuable attention to improving their welfare. We are delighted to have been able to support them in this work."

**Géraldine Kutas**
DIRECTOR OF CORPORATE AFFAIRS & COMMUNICATION - EVP
CEVA SANTÉ ANIMALE

# PANDEMIC PREPAREDNESS: A ONE HEALTH PUBLIC-PRIVATE PARTNERSHIP IN UGANDA DELIVERS SUSTAINABLE PREVENTATIVE HEALTH AND ECONOMIC BENEFITS



ONE HEALTH

## Zoonoses

**Knowledge of infectious diseases amongst members of the public has risen dramatically recently due to the Covid-19 pandemic. Now everyday discussions might include casual references to lateral flow and PCR tests, RNA vaccines, herd immunity, modelling, R numbers – terminology that, until recently, was limited to health professionals and researchers.**

**The achievement of developing, testing and deploying at vast scale effective vaccines within just a few months of the first detected cases of Covid-19 is truly remarkable. However, it has, perhaps, raised unrealistic expectations – if this could be done for a new threat like Covid-19, why can't similarly effective vaccines be produced for other infectious diseases in timeframes measured in months rather than years or decades?**

Unfortunately, not all disease-causing pathogens, which include bacteria, fungi and parasites as well as viruses, are the same; many employ complex strategies to evade immune responses of people or animals.

So, for example, after four decades and an enormous global effort there is still no vaccine for HIV/AIDS. Only recently have vaccines against malaria been developed, although the latter are far from ideal and, so far, have been administered on a tiny scale making very little impact on the hundreds of millions of cases of malaria reported annually and the hundreds of thousands of deaths officially attributed to this scourge each year.

Sleeping sickness is a serious, often fatal human disease caused by a single-celled parasite that is transmitted by the tsetse fly as it feeds on blood. Sleeping sickness in people and a few closely related livestock diseases that occur only in Africa are another group of diseases for which it has proved to be impossible to develop effective vaccines despite decades of work by scientists around the globe.

This is why, over the past 20 years, Ceva has actively supported a research program that generated the evidence-base for the creation of a public-private partnership led by the government of Uganda, known as SOS – short for Stamp-Out Sleeping Sickness – that set out to prevent sleeping sickness in Uganda. The SOS consortium brought together experts and policy makers from the Ugandan government, researchers from Makerere University, Uganda and the University of Edinburgh, Scotland, and also Ceva and IKARE. IKARE is a UK registered charity that uses best business practices and venture philanthropy principles to achieve societal impact.

Research carried out by members of the SOS consortium, led by the University of Edinburgh, demonstrated that the parasites that cause the acute form of sleeping sickness primarily live in cattle which are unaffected by their presence. However, tsetse flies can become infected with the parasites as they feed on the blood of infected cattle and then, if they go on to feed on people, the parasites can be transmitted to them.

The SOS team showed that a person in Uganda is up to 100 times more likely to develop sleeping sickness by becoming infected as a result of the bite of a tsetse that had become infected by feeding on a bovine than from a tsetse that had become infected feeding on a person.

In the past, sleeping sickness was largely controlled by mass screening of people for the parasite – which required a needle to be inserted into their spinal cord to obtain a sample of spinal fluid – and treating positive cases with powerful drugs. Both the diagnosis and treatment were unpleasant and potentially life-threatening.

Fortunately, the SOS team demonstrated that it was possible to treat cattle rather than people; if the parasites could be eliminated from cattle, then they could not be passed on to people via biting tsetse flies.

They showed that once the parasites had been eliminated from the cattle by using drugs, spraying the animals with a veterinary insecticide that repelled most tsetse and killed any that landed on the cattle was sufficient to prevent reinfection.

Regular monthly spraying of cattle resulted in direct benefits for cattle owners through reduced disease pressure from the cattle form of sleeping sickness and also through prevention of tick-borne diseases due to tick control.

**Better disease control was estimated to generate productivity gains in cattle worth USD 30 per head per year.**





As Martin Mitchell - Ceva's Chief Sustainability Officer - explained:

"In the early stages of SOS, Ceva's role had largely been to donate the trypanocidal drug used to clear the sleeping sickness parasites from the cattle's blood and also the insecticidal spray used to control the tsetse flies. Our support enabled the SOS team to demonstrate proof-of-concept for treating cattle to prevent the disease in people.

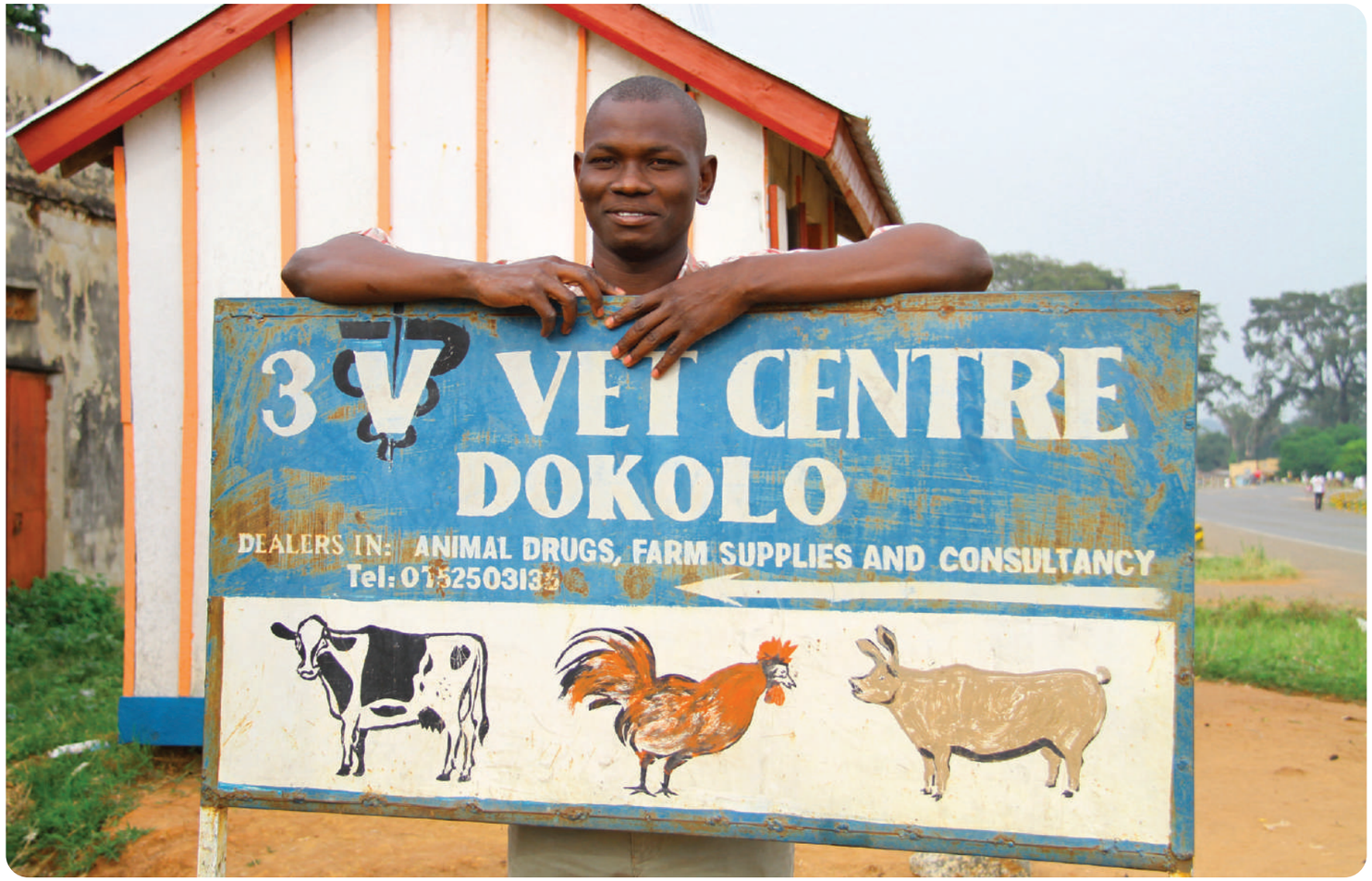
It soon became apparent, however, that the infrastructure and human resources for supporting mass treatment beyond a short-term project approach was lacking. In the areas of Uganda most affected by sleeping sickness, there were no local private veterinary practices, no shops selling animal health products and an acute shortage of government vets.

The challenge was to develop a strategy to enable millions of cattle to be treated in the long term and in a sustainable manner. This is where our experience as a major supplier of animal health products in Africa came to the fore. We realised that the solution was to help establish a sustainable and viable business model. IKARE, with their private equity experience from building stronger companies through active ownership agreed and provided the necessary start-up funding to match our technical support.

So, under the auspices of SOS, between 2009 and 2011 a total of eleven young newly graduated vets from Makerere University were supported to establish private veterinary practices in the areas most affected by sleeping sickness. The veterinary businesses were branded 3V Vets, originally a reference to the three key Ceva products, all beginning with the letter v, Veriben, Veridium and Vectocid, used to treat cattle to prevent sleeping sickness spreading to people. Today, as the 3 V Vets businesses work with many different suppliers, the three Vs stand for Village Value Veterinary services.

To enable large numbers of cattle to be regularly sprayed with insecticide, each vet recruited a team of initially 40 or so local community members (farmers, teachers etc) who provided a mobile cattle-spraying service. This network has over the years grown to some 400 so called spray persons. The young vets were initially paid a salary, supplied with a motorcycle, mentored and supplied with the necessary animal health products channelled through a local company, High Heights Services Limited, and they also received technical, business and financial support and training from Ceva and IKARE. The proprietor of HHS Ltd was a professor


ONE HEALTH - ZOONOSES




from Makerere Veterinary School who had been involved in the SOS program from the outset.

The number of cattle being regularly sprayed has increased year-on-year: in 2018, 1.5 million cattle, or 70% of the herd, were sprayed. In addition to effectively controlling sleeping sickness, the productivity gains in treated cattle amount to USD 45 million a year.

With the Ugandan government reinforcing spraying practices through paying for catalytic spraying exercises with up 25% of the herd to be sprayed this means the control of sleeping sickness is achieved through a combination of farmers doing it for themselves and public good to protect the broader community.

The cost of spraying 25% of the cattle herd is a much cheaper and more effective way of controlling the disease than the previous approach which involved surveillance of at-risk communities and hospitalisation and treatment of diagnosed patients. The economic value of sleeping sickness cases averted, detrimental impacts on the health and wellbeing of surviving patients, and care costs averted has been estimated at up to USD 400 million a year.

One thing Ceva together with IKARE brought from the private sector was a perspective where we knew we would have to exit. And when you know that you've going to leave, you've got to think about your legacy and train people locally so they are able to deliver whatever you jointly have agreed you want to achieve. So, looking back more than a decade, we have I think five of the young veterinarians that we trained and set up in business still there in 2022.

Since the SOS campaign began in 2006, the number of cases of sleeping sickness in people in Uganda has dropped steadily from several hundred a year. In recent years, only a handful of cases have been detected and in 2020 no cases at all were reported in the SOS campaign area. Sleeping sickness as a public health risk in Uganda has been virtually eliminated."

**Patrick Opondo was one of the original 3V Vets whose business is still thriving in 2022.**

"We, the 3V Vets, feel proud of being able to be part of the initiative that has managed to supress sleeping sickness in humans as well as creating improvement in animal welfare and increasing the livelihoods of people. The SOS campaign has been highlighted by the World Health Organisation as one of the most successful examples of One Health in practice globally. A review published in the respected, peer-reviewed journal PLoS Neglected Tropical Diseases suggested that the SOS public-private partnership could serve as a model for other regions and diseases in order to develop sustainable prevention and control systems."

Dr. Patrick Opondo
VET DOCTOR TO VETERINARIAN

**Commenting on the success of SOS, Professor Sue Welburn from the University of Edinburgh, who led the research program from the outset, pointed out:**

"The SOS partnership has undoubtedly been a great success. The fact that no cases were detected in southeast Uganda in 2020 needs to be considered against the backdrop of Covid-19 and the restrictions this placed on surveillance activities. However, the number of human cases has been close to zero each year since 2016. I am confident that as long as sufficient cattle are regularly sprayed with insecticide, we will never again witness the distressing sight of hospitals in Uganda full of sleeping sickness patients. SOS demonstrates just what can be achieved when the public and private sectors, and local and international partners, join forces and work together, tirelessly to achieve a common goal."

Professor Sue Welburn
UNIVERSITY OF EDINBURGH


QTEST CARDS

# Q-FEVER, THE "EMERGING ZOONOSIS" NOW EASILY DETECTABLE

**A paper published recently online by the Journal of Dairy Science, the world's leading peer-reviewed dairy research journal, presents evidence from validation trials that show Ceva's QTest is an effective and practical approach to the diagnosis of Q fever in dairy herds.**

Drops of milk taken from dairy farm bulk tanks are simply placed on the QTest cards and allowed to dry. This renders the potentially dangerous pathogens in the milk harmless and the samples stable so that the cards can be safely sent through the post, even from overseas, to an expert diagnostic lab. This is the first time this technology has been used in this way and represents a real breakthrough for veterinarians and dairy farmers in the diagnosis of this serious and increasingly prevalent disease. Q fever, also known as coxiellosis, is a highly contagious bacterial disease that primarily affects cattle, sheep and goats.

It is a zoonosis, meaning people can become infected from these animals when they are exposed to airborne dust that has been contaminated by infected animal faeces, urine or birth products such as placentas and aborted foetuses. Although most human cases are mild, it can cause serious clinical signs, including abortion. Therefore, Q fever represents a particular risk to pregnant women. On the farm, as well as representing a potentially serious threat to the health of front-line farm and veterinary personnel, and other people living in the vicinity, it is an important cause of livestock abortions and other reproductive problems, and can lead to major economic losses. In the case of goats, devastating 'abortion storms' can affect up to 90% of pregnant animals. Recent surveys suggest that Coxiella burnetii, the pathogen responsible for Q fever, is present on at least half of European dairy farms. However, since the disease is mostly insidious and the conventional means of diagnosis can be quite challenging, only a small percentage of farmers know that Q fever is present in their farms. To address this problem and build awareness of this dangerous but preventable disease, Ceva's ruminant team have developed a new diagnostic tool for Q fever – the QTest.The QTest is based on the use of an established technology, FTA cards, which is already used for the diagnosis of a number of diseases, including mastitis in dairy cattle.

QTest cards are made from specially treated paper designed to collect and preserve milk samples for subsequent analysis of Coxiella burnetii. Chemicals contained in the cards inactivate any bacteria or viruses present in the bulk tank milk samples but preserve their DNA and RNA for subsequent detection by the highly sensitive and specific PCR method. Because the cards are stable and harmless, they can be legally and safely sent through the post to an expert diagnostic lab. This approach links dairy farms around the world to an expert laboratory thereby making high-quality Q fever diagnostic testing much more widely available.

The recent journal paper presents results from validation studies. These showed that QTest cards spotted with milk samples known to be contaminated with Coxiella burnetii were stable at temperatures up to 37°C for 29 days – so, when subsequently analysed using the PCR test, they showed positive results. They also demonstrated that in PCR tests conducted using milk samples stored for up to 14 days, detection was higher for the QTest cards than for raw milk. These results are important because they confirm that QTest cards can be posted to the central lab, even from hot countries.

**In their paper the authors conclude:**

"To our knowledge, FTA cards have never been used for C. burnetii DNA detection from (bulk tank milk). This tool offers a breakthrough innovation to farmers and veterinarians, increasing awareness of the disease and leading to better management of the disease in herds as well as better zoonotic risk management."

**Journal of Dairy Science**

THE WORLD'S LEADING PEER-REVIEWED DAIRY RESEARCH JOURNAL

# AVERTING THE NEXT GLOBAL PANDEMIC: THE CASE FOR MASS VACCINATION OF PIGS AGAINST SWINE FLU

Mass vaccination of pigs could avert the next global influenza pandemic, and effective vaccines are available, so why aren't more pigs vaccinated against swine influenza?





**In January 2009, a novel strain of influenza A virus is believed to have emerged in pigs in central Mexico. The strain, known as (H1N1) pdm09 virus, contained a unique combination of influenza genes not previously found in the same virus. It was able to jump species and infect people and proved to be capable of human-to-human transmission. It rapidly spread from Mexico, first to the United States and within a few months to 74 countries across the world. The WHO declared a global influenza pandemic. A year later, when the pandemic was declared over, it was estimated that more than half a million people had died with 80% of deaths occurring in people under 60 years of age.**

The (H1N1)pdm09 virus was different to any other influenza A strains circulating at the time. While young people tended not to have any existing immunity to the new virus, around one-third of over 60 year-olds had antibody against this virus, most likely due to being exposed to a different strain of H1N1 virus in the past. The seasonal flu vaccines being used that year provided little protection from the new strain and although a vaccine against the pandemic (H1N1) pdm09 virus was produced, when it eventually became available in November 2009, the peak of the pandemic was already over. However, the H1N1 virus continues to circulate as a component of the global seasonal flu burden which usually causes several million cases of severe disease and several hundreds of thousands of deaths each year.

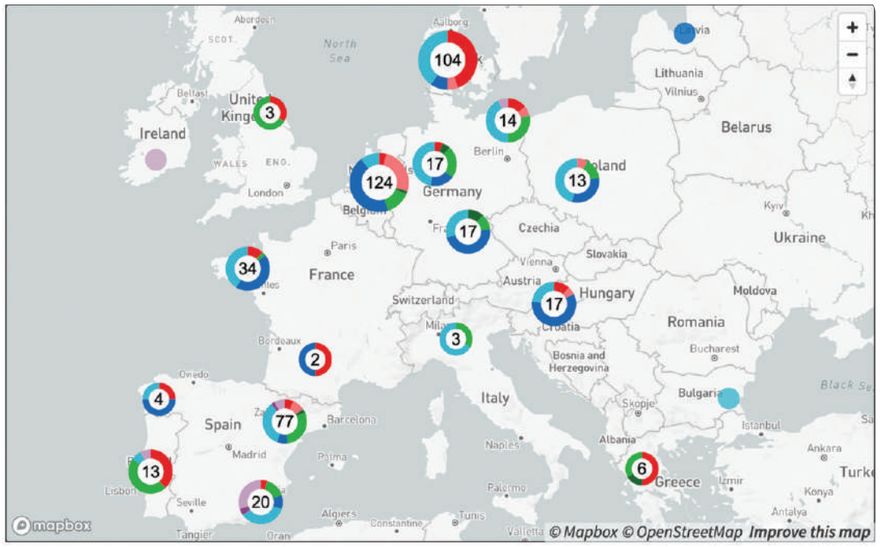
## EUROPE'S PIGS COULD BE SOURCE OF NEXT INFLUENZA PANDEMIC

A recently published peer-reviewed study[5], based on surveillance work funded by Ceva, suggests that Europe's pig herds represent an increasing risk of being the source of the next pandemic influenza virus. The study, for which pigs with respiratory problems were sampled from 2,500 farms in 17 European countries, revealed that on more than 50% of farms surveyed there was a year-round presence of up to the four major lineages of swine influenza A viruses.

Pigs can be become infected with strains of influenza virus from other pigs, birds and people. These strains can then mingle within the pigs where there is the potential for reassortment of the individual strains' genetic material, giving rise to novel strains. This is presumably what happened in Mexico in 2009. The recent study demonstrated that intensive reassortment of swine flu lineages together with human pandemic virus has produced at least 31 distinct genotypes in pigs, including some that have characteristics associated with the potential for zoonotic transmission (that is to infect people).

# DYNAMIC SWINE FLU MAP

**DISTRIBUTION OF INFLUENZA SUBTYPES PER COUNTRY**
**"The country clusters show the entire detected strains in a country regardless the region for the actual year"**




**Map legend:**

| | | | |
|---|---|---|---|
| H1pdmN1 | H1huN1 | H1avN1 | H3N1 |
| H1pdmN2 | H1huN2 | H1avN2 | H3N2 |
| H1pdmNx | | | |

The authors of the recent paper concluded that European swine populations serve as reservoirs for emerging influenza strains that have the potential to infect people and, perhaps, go on to cause pandemics. Fortunately, since 2009 this has not happened.

## MANAGEMENT OF INFLUENZA IN PEOPLE AND PIGS

In people, the main tools used in the management of seasonal influenza are surveillance and large-scale annual vaccination programmes targeted at vulnerable members of the population. Each year, the WHO makes recommendations for the composition of influenza vaccines in the northern and southern hemispheres. These are based on the circulating strains of influenza A and B[6] that have been reported by different countries that year. In Europe, it is widely accepted that vaccination is the most effective public health intervention to mitigate and prevent seasonal influenza. The Council of Europe recommends that vaccination coverage for groups at higher risk of severe disease and complications should be at least 75%. Different countries target different groups for vaccination but these always include the elderly and those with suppressed immune systems.

In addition, some also vaccinate healthcare workers, pregnant women, children and adolescents. In practice, in 2016/17 only one European country achieved the target of vaccinating 75% of the elderly.

During seasons when the virus strains included in the flu vaccine are similar to circulating flu viruses, the vaccines are relatively effective, reducing the risk of flu illness by 40-60% among the overall population, although in years where the match is less good the effectiveness can be much lower. None-the-less the principle of using vaccination to protect vulnerable sectors of the human population is well established in Europe. In the post-Covid era, public health authorities are placing greater emphasis on seasonal flu vaccinations.

One consequence of the lock-downs was that very few cases of flu occurred in people in the winter of 2020/2021 and it likely that there will be many more cases in 2022/2023. With Covid-19 still causing significant disease and hospitalisations, health authorities throughout the world are keen to prevent influenza cases taking up valuable hospital beds.


**Since the 2021 European Symposium of Porcine Health Management (ESPHM), Ceva has gathered an enormous amount of scientific data from experimental and field trials, and was able to share 6 oral presentations and 87 scientific posters at the 2022 ESPHM event, representing no less than 25% of the total communications delivered at the event. For swine influenza, infected herds were shown to have advantages in fertility and other performance parameters after vaccination with Respiporc® FLU 3 and/or Respiporc® FLU PAN.**

This situation in people contrasts markedly with that in pigs. Although influenza in people is largely seasonal occurring mostly during winter, swine flu in pigs is not seasonal and can occur year-round. So, while human influenza is controlled using a single vaccination administered at the start of the flu season in autumn, the recommendation for pigs is to vaccinate sows every 4 months.

Pig farmers and their vets are often hesitant to follow recommendations for mass vaccination of their herds on the grounds they consider this to be too expensive. However, as the survey referred to above shows, pig herds in Europe are very often infected with influenza A virus. Swine flu in pigs can have considerable impacts on productivity due to both the direct impacts of the swine flu virus and also because the presence of influenza virus increases the risk of secondary infection with a range of bacterial infections. The latter means that treatment costs are higher and use of antibiotics is increased, which is highly undesirable and a risk factor in emergence of antibiotic resistant strains.

Trial data has shown that the vaccination of pigs against swine flu can significantly increase productivity in infected herds. For example, in a large-scale study undertaken in Germany, herds infected with pandemic influenza A virus were vaccinated using Ceva's Resiporc-FLUpanH1N1 vaccine. Comparing before and after vaccination performance, on average vaccinated sows weaned 1.33 additional piglets per year.

The rate of return on the investment in vaccination was calculated to be over 5.1: 1. For a 1000-sow farm, it was estimated this would be worth an additional income of €28,000 per year.

*(5) Surveillance of European Domestic Pig Populations Identifies an Emerging Reservoir of Potentially Zoonotic Swine Influenza A Viruses - PubMed (nih.gov)*
*(6) Unlike influenza A virus, influenza B virus is known only to infect humans and seals.*

As sows make up only about 10% of the total pig population on farm, their non-vaccinated offspring represent a vulnerable group of animals that can keep the virus circulating. Maternally derived antibodies that piglets receive from their vaccinated mothers are able to protect piglets from clinical signs, but infection still takes place. Vaccination strategies implemented on farm should therefore also include piglets and fatteners: they can be a source of reassortment and infection also causes a huge economic impact due to reduced daily weight gain and increased use of medication.

It's not just pig farmers and vets who are wary of vaccinating pig herds against swine flu – many influenza professionals are also sceptical. For example, in a recent article in The Scientist, Martha Nelson - an evolutionary biologist in the Intramural Research Program at the US National Institute of Allergy and Infectious Diseases wrote: "Drug companies have tried to manufacture vaccines for swine flu, but they struggle to keep up with a moving target. Influenza simply evolves too fast and has too many different strains."

And yet, trials have shown that the Ceva vaccines are effective in preventing clinical disease due to all the circulating swine flu strains, although to protect against most lineages of influenza A circulating in pigs in Europe, a combination of the two Ceva vaccines, RespiporcFLU3 and RespiporcFLUpanH1N1, is required. While it is true that they cannot totally eliminate virus, they prevent clinical disease and significantly reduce the amount of virus in circulation, thereby reducing the opportunity for viruses to mix, exchange genetic material and emerge as new, potentially pandemic strains. It is ironic that, although vaccines against swine flu for pigs are much more effective in preventing clinical disease than flu vaccines used in people, while the widespread use of the vaccines in people is widely accepted, the use of much more effective vaccines in pigs is doubted by many vets, pig farmers and public health experts alike.

### STRATEGIES FOR INCREASING EFFICACY OF SWINE FLU VACCINES

Even though swine flu vaccines in pigs are already more effective than flu vaccines used in people, several strategies can be used to further increase the efficacy of swine flu vaccines used in pigs.

All the pig vaccines against swine flu that are licensed in Europe include the use of adjuvants in the vaccine composition. Adjuvants are certain types of chemicals which specifically stimulate the immune system and may potentiate vaccine efficacy. The disadvantage of adjuvants is that they may cause more local reactions, such as swellings at the site of injection, and also short-lived systemic reactions, such as fever or pain. For this reason, adjuvants are not used in most human flu vaccines, although they are used in some cases, for example for vaccines for the elderly in the UK. In this case the adjuvant is used because immune responses of older people are generally weaker than those of younger people.





Most influenza vaccines for use in people contain small fragments of virus particles from a number of different strains; trivalent or increasingly tetravalent vaccines, containing viral particles from three or four different strains, are most commonly used throughout the world. In contrast, pig vaccines are made from whole, inactivated viruses – in the case of Ceva's RespiporcFLU3 vaccine this contains whole inactivated viruses of three strains of swine flu virus which between them cover three of the four major lineages of influenza A virus and in the case of ResiporcFLUpanH1N1 this contains whole inactivated virus from a strain originally isolated from a human case of influenza. So, while the human vaccines mostly contain just the viral proteins that are the major determinants that induce protective immunity, the pig vaccines contain the full range of viral structural proteins. Some of these additional proteins may also induce immunity and thereby boost the efficacy of the vaccines, and may also provide broader protection against a wider range of strains.

Each year, new seasonal flu vaccines are produced for people which are designed to closely match the influenza strains circulating that year. The regulatory authorities allow human vaccine manufacturers to replace the stains included in annual flu vaccines based on the recommended strains providing certain standard procedures are followed. Current regulations controlling the use of veterinary vaccines in Europe preclude that option: changing the strains used in the currently licensed pig vaccines would necessitate a mandatory and lengthy approval process which would be impractical and uneconomic for the vaccine manufacturers.

As noted previously, pigs can become infected with swine flu strains from other pigs, birds and people. Of these, people are likely to be the major source of infection: although the disease is called swine flu, from the pigs perspective it is actually human flu. For this reason, pig farmers and other people who come into contact with pigs should be encouraged to have their annual flu vaccination.

In addition to vaccination of pigs and people, adoption of effective biosecurity measures – such as all-in, all-out rearing systems for piglets and deep cleans between batches - can help to prevent virus circulation between pigs and also reduce the incidence of secondary bacterial infections.

## CHANGING ATTITUDES POST-COVID

**Covid-19 has very clearly demonstrated the enormous economic and human costs associated with a global pandemic of a respiratory virus.**

The global population of pigs has grown steadily over the past decades, from around 400 million in the early 1960s to close to one billion today. At the same time, the average size of pig farms has also increased. Throughout the world, small, backyard pig production has given way to large, commercial pig units. Whereas in the 1990s a large pig farm would have 200 breeding sows, now many farms have thousands or even tens of thousands of sows. These changes in the way pigs are reared, combined with the fact that pigs serve as very efficient hosts for influenza viruses from pigs, birds and people to mix and swap genetic material, make it increasingly likely that the next global influenza pandemic will arise in pigs.

Mass vaccination of sows and their offspring against swine flu would deliver direct benefits to pig farmers – reducing disease and boosting productivity in ways that are highly cost-effective. If such a strategy could also avert the next global pandemic, the return on investment would be incalculable, not to mention the human suffering prevented and lives saved.

Now, therefore, appears to be a very good time to make vets, pig farmers and public health authorities aware of the potential benefits of mass vaccination of pig herds. The big question that still needs answering, however – as is the case with all diseases that can spread from animals to people – is who pays and who benefits? Let's hope the world's public health and veterinary authorities can answer that question before the next global pandemic strikes.

**CEVA PHYLAXIA CAMPUS HUNGARY,** CEVA'S LARGEST VACCINE PRODUCTION CENTRE.

# CEVA SUPPORTS NEW INTERNATIONAL CORONAVIRUS NETWORK TO COMBAT FUTURE AND EMERGING CORONAVIRUSES

**Ceva has several decades of experience in producing vaccines against diseases caused by coronaviruses, such as infectious bronchitis of chickens.**
**The company also produces one of the world's most widely used veterinary coronavirus vaccine, Cevac IBird®: 12 billion birds were vaccinated with Ceva's avian coronavirus vaccines range in 2020.**

It is not surprising, therefore, that a Ceva vaccinology and coronavirus expert, Zoltan Penzes - Ceva's Global Director, Bio Innovation and R&D - was invited to serve on the board of a new initiative - the UK International Coronavirus Network (UK-ICN).

The UK-ICN aims to improve global coordination on research and sustained One Health approaches to combat future and emerging coronaviruses. It is led by Professor Julian Hiscox from the Institute of Infection, Veterinary and Ecological Sciences and the Pandemic Institute, University of Liverpool.

Professor Hiscox and Zoltan were colleagues at the Institute for Animal Health at Compton, UK in the 1990s, and have previously worked together on studying coronavirus replication and transcription mechanism.

The UK-ICN is a response to the recognition that there is a major gap in understanding the transmission of coronaviruses from animals to humans and between animal species.

Specific objectives of the UK-ICN include to:

> Facilitate and co-ordinate interactions, especially at the animal-human-environment interface.

> Create research opportunities and build an evidence-based road map for One Health.

> Ensure the longevity of coronavirus research after the impetus of SARS-CoV2 (the virus that causes Covid-19) has reduced.

> Disseminate and preserve knowledge to better combat future emerging coronaviruses.

**As Zoltan explains:** *"These objectives fit perfectly with Ceva's new business purpose, which includes a commitment to drive innovative health solutions to stop the threat of cross-species diseases.*

*Ceva's support to UK-ICN will include sponsorship of a workshop focused on the human-animal interface, to be held in Belfast in 2023. The workshop will bring together the world's leading experts in the field of coronaviruses and the human-animal interface, and we hope to explore how One Health partnerships between public and private sector actors can deliver long-term, sustainable approaches to better combat future emerging coronaviruses.*

*In addition to expertise and knowledge about veterinary coronaviruses, Ceva also has unique experience to share about sustaining a long-term and effective public-private partnership in an unrelated field – sleeping sickness control in Uganda. So, we hope we can share lessons and experience from more than a decade of our active involvement in the highly successful Stamp-Out Sleeping Sickness campaign to help inform effective partnerships and approaches to combat future coronavirus threats."*

Julian Hiscox
Director of UK-ICN

**Director of UK-ICN, Professor Hiscox said:**

***"We have seen with animal coronaviruses that they do not respect geographical or political borders, and neither does SARS-CoV-2. The decades of research on diagnostics and vaccines to animal coronaviruses has lots to teach in terms of dealing with severe coronavirus pandemics both in the present day and preparing for Disease X in the future. I am therefore delighted that leading animal health businesses, including Ceva, are taking an active role in UK-ICN. It is also nice to be back in touch with an old colleague from PhD days! These in person meetings will allow the new generation of researchers to connect and form their own networks and support groups, that greatly suffered during the COVID-19 pandemic."***

# AVIAN INFLUENZA: FRENCH MINISTER BACKS POLICY SHIFT TO ALLOW VACCINATION OF POULTRY

In the poultry sector, France is the most affected country, especially in the poultry-dense foie gras area, and more than 5.5 million birds having been culled this winter. With veterinary services sometimes overwhelmed by the scale of the task, inhumane culling methods, including turning off ventilation in poultry houses and allowing the birds to die of heatstroke, have been used in some extreme cases in Europe and are common practice in the US.

In response the former French Agriculture Minister, Julien Denormandie, recently said: ***"In the long term, there will be no solution other than vaccination."***

Trials are currently scheduled in France involving two commercially available HPAI vaccines in ducks, one of which – an innovative RNA vaccine - is produced by Ceva. But the current EU policy banning their use will need to be changed before they can be more widely used in France and beyond.





**Continental Europe and the UK has recorded the highest ever number of outbreaks of the globally predominant H5N1 strain of highly pathogenic avian influenza (HPAI) this winter (2021/22). The results has been that over 17.5 million poultry have been culled and large numbers of wild birds, especially wild geese, have been found dead. In addition, the future of free-range poultry production has been brought into question with compulsory housing of all domestic birds throughout the winter.**

Worrying signs suggest a change in the epidemiology of the disease with a wider range of wild bird species affected. There also appears to be a shift from a seasonal disease, associated with the arrival and presence of wild migratory waterfowl in winter, towards an endemic disease, with the virus circulating year-round in resident as well as migratory bird species. In Europe this winter, just 17 of the 66 species of wild bird in which HPAI has been detected were waterfowl with resident species such as pigeons, gulls, pheasants and greenfinches all affected.

During this summer (2022), in an unprecedented shift, H5N1 has been detected in a variety of seabirds in the UK and north-west Europe resulting in mass die-offs in breeding colonies especially around the UK coastline. This has included species such as gannets, great skuas, puffins, guillemots, common eider ducks, herring gulls, and arctic, sandwich and common tern, and also a breeding colony of roseate terns, one of the UK's rarest breeding seabirds.

The virus has also been detected in a range of wild mammal species in Europe, including the fox, with indications that some of the viruses isolated show genetic markers of adaptation to replication in mammals. Fortunately, this season there have been very few cases in humans and the threat to the general public is considered to be low.

Currently the policy for controlling HPAI in Europe and the UK relies on maintaining effective biosecurity, including compulsory housing of all birds during risk periods, and mass culling of poultry around detected outbreaks. Vaccination is currently not allowed and many countries ban imports of poultry products from vaccinated birds. However, with the current approach to managing HPAI clearly proving inadequate to cope with the level of disease risk, attitudes are beginning to change.

In the poultry sector, France is the most affected country, especially in the poultry-dense foie gras area, and more than 5.5 million birds having been culled this winter. With veterinary services sometimes overwhelmed by the scale of the task, inhumane culling methods, including turning off ventilation in poultry houses and allowing the birds to die of heatstroke, have been used in some extreme cases in Europe and are common practice in the US.

Free-range poultry producers have been especially hard hit. For the third winter in succession, many European free-range producers have been forced to house their birds throughout the winter. This raises welfare issues as free-range poultry housing is designed primarily to provide secure accommodation for birds at night.

Current regulations in the EU and UK permit producers to continue marketing eggs and birds as free-range provided they are not housed for more than 16 weeks. This cut-off was exceeded this year and after this period all eggs and birds had to be marketed as barn reared, depriving free-range producers of the price premium they could previously command. In the UK, prior to the current ban, free-range eggs accounted for two-thirds of the market.

Outbreaks of HPAI even on large, well-managed farms with excellent and robust biosecurity measures have prompted some experts to question whether reliance on such measures is still feasible, especially if HPAI becomes endemic in resident wild bird populations in Europe, meaning a year-round threat of outbreaks. HPAI is already recognized as being endemic in Bangladesh, China, Egypt, India, Indonesia and Vietnam. Mass vaccination against HPAI has been used in some countries since 2004, with China, Egypt, Indonesia and Vietnam accounting for more than 99% of vaccines used.

In 2022, the World Organisation for Animal Health (formerly OIE) updated its chapter on avian influenza to include: "Vaccination can be used as an effective complementary control tool when a stamping-out policy alone is not sufficient…"

# SURGE IN LOCALLY TRANSMITTED DENGUE FEVER CASES IN FRANCE IN 2022 ATTRIBUTED TO CLIMATE CHANGE AND GLOBALISATION

Climate change is not only about increased frequency and severity of floods, wildfires and drought. It is now directly impacting public health, such as with the emergence of diseases previously confined to the tropics in more temperate climates, including Europe. Dengue fever is a case in point…

**Like malaria, dengue fever is a serious mosquito-borne disease. Caused by the dengue virus, the disease can manifest as range of illnesses in people from mild, through acute flu-like symptoms, to a severe form that can be fatal. There are estimated to be up to 400 million infections annually, mostly in Asia and Latin America, and several thousand deaths, mostly in younger age groups. According to WHO, cases of dengue fever have increased 8-fold over the past two decades.**

Until recently dengue fever was found almost exclusively in tropical and sub-tropical parts of the world. A few isolated cases were reported in temperate regions, including France, but these were individuals who had been infected while they were visiting regions where dengue fever was endemic.

The first case of locally transmitted 'native' dengue fever in France was recorded in 2010 – that is a patient who had not travelled to a known at-risk country but became infected in France from the bite of an infected Asian tiger mosquito. For this to happen the mosquito must have fed on another person who had become infected with the dengue fever virus, most likely while travelling in an endemic country.

Between January and September 2022, more than 60 cases of native dengue fever had been reported in France, more than the cumulative total for the previous decade. With many cases of dengue fever being asymptomatic or mild and diagnosis of many diseases having been adversely affected by the Covid pandemic, the actual number of cases is likely to be much higher. Since 2010, native dengue fever cases have also been reported in Croatia, Germany, Italy and Spain.

Asian tiger mosquitoes, originally found only in Asia, are considered to be one of the world's 100 worst invasive species. Since the 1960s they have been spreading round the world and are now found on every continent except Antarctica.

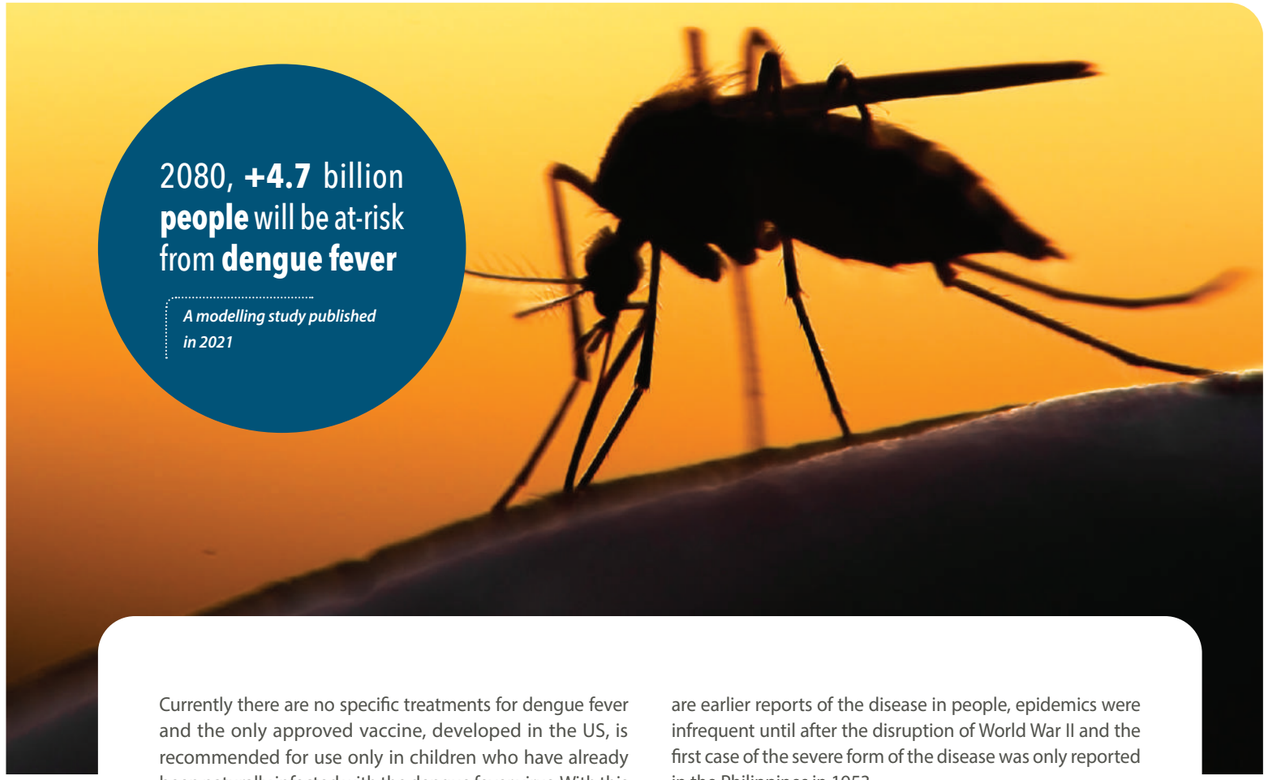
They were first detected in France in 1999 and are now established in more than half the country with further northern spread expected.

The wider distribution of tiger mosquitoes has been aided by climate change and globalisation. Rising temperatures mean the species can survive and thrive over a wider range and at higher latitudes. This is exacerbated by the fact that the eggs and adults are more cold tolerant than many other tropical and sub-tropical mosquitoes.

Documented routes by which tiger mosquitoes have arrived in Europe and other regions include as desiccated eggs in used tyres. The mosquitoes breed in water that collects in used tyres stored outside in tropical and sub-tropical regions. The eggs can then survive dry and cold conditions while they are shipped internationally until they hatch when the tyres are again stored outside and water collects in the rims. The international trade in used tyres is enormous – worth USD 2.26 billion in 2020.

Another major route is in shipments of the popular houseplant *'lucky bamboo'* – not actually a bamboo, rather the plant *Dracaena sanderiana* - which is typically shipped from Asian countries in water to keep it alive.

A modelling study published in 2021 suggested that under a worse-case scenario of climate change, with temperatures increasing 3.7°C by 2100 relative to pre-industrial levels, the situation could get much worse. The study forecasts that globally an additional 4.7 billion people will be at-risk from dengue fever by 2080 compared to 1970-1999. This would include a northward shift in the dengue belt covering central northern Europe and northern USA as well as the Western Pacific region, Eastern Mediterranean region and highland areas in Central and Latin America.




Currently there are no specific treatments for dengue fever and the only approved vaccine, developed in the US, is recommended for use only in children who have already been naturally infected with the dengue fever virus. With this disease now becoming an increasing threat in the US and Europe, as well as tropical and sub-tropical regions, there is likely to be a more concerted effort to develop new, more effective vaccines. However, as the Covid-19 pandemic has shown, the real challenge is ensuring that these vaccines are made available to everyone who needs them, not just those fortunate enough to live in rich countries.

Public health authorities in France and other southern European countries are extremely concerned about the spread of Asian tiger mosquitoes. Not only can they transmit dengue fever but also other serious threats to human health such as malaria, West Nile virus, yellow fever, Zika and chikungunya – all of which are currently mostly confined to tropical and sub-tropical regions.

In the UK, it is thought that the tiger mosquito has not yet established, although eggs of this species have been detected in water traps in the southeast of the country since 2016 – most likely from adult mosquitoes imported via lorries or ships from mainland Europe. Entomologists from the UK Health Security Agency regularly visit sites at seaports and airports in the south of the country where they trap mosquitoes and other potential disease vectors to check for invasive species and to screen for dengue fever virus and other emerging and re-emerging pathogens.

In the face of growing threats from emerging and re-emerging diseases, there is widespread agreement among public health experts that increased surveillance and deployment of powerful new tools, such as the use of artificial intelligence and routine monitoring for pathogen RNA or DNA in sewage, will become more and more important if we are to prevent the next pandemic.

Until a few hundred years ago, the dengue virus rarely affected people. Rather it was largely transmitted between mosquitoes and nonhuman primates in Asia and Africa. Although there are earlier reports of the disease in people, epidemics were infrequent until after the disruption of World War II and the first case of the severe form of the disease was only reported in the Philippines in 1953.

Today it is believed that the dengue virus is most often transmitted between humans via mosquitoes. However, the virus has been detected in a number of animal species, including monkeys, rodents, bats, pigs and dogs. Especially in developing regions of the world, as the human population grows and encroaches into formerly wildness areas, people and wild animals are coming into ever closer contact, while domestic animals and people co-exist even in densely populated urban areas. In these settings, it is possible that these species play a role in the epidemiology of the disease although more research is needed in this area.

As a committed One Health company, Ceva recognises that the health and wellbeing of people, animals and our planet are all interconnected and mutually dependent. Although the role of animals in the epidemiology of dengue fever is not yet clear, wild and domestic animals are directly implicated in the majority of emerging and re-emerging infectious diseases. This is why a key pillar of Ceva's new purpose statement is focused on driving innovative health solutions to stop the threat of cross-species diseases (zoonoses) including the interface with wildlife.

Some good examples of how Ceva lives up to its One Health ethos and focus on innovative health solutions for zoonoses include working in Uganda in a long-term public-private partnership that has succeeded in virtually eliminating sleeping sickness as a public health threat; developing and making available tools to help reduce the risk of potentially fatal Q-fever spreading from cattle and goats to people, especially in Europe; and contributing expertise and financial support to the the UK International Coronavirus Network (UK-ICN), which aims to improve global coordination on research and sustained One Health approaches to combat future and emerging coronaviruses.

# CEVA EXPERT CHAIRS NEW EUROPEAN SWINE FLU NETWORK (ESFLU)

**In November 2022, a new initiative, the European swine flu network (ESFLU), was launched to improve information sharing, awareness and preparedness concerning swine influenza in Europe.**

The network was established under the auspices of the European Cooperation in Science and Technology (COST), a European Union funding body which provides networking opportunities for researchers and innovators in order to strengthen Europe's capacity to address scientific, technological and societal challenges. ESFLU has been funded to run for 4 years.

Gwenaëlle Dauphin, an internationally recognized expert on swine flu based at Ceva's Science and Investigation Department, was elected chair of ESFLU. This is a notable achievement as it is the first time in COST's 50-year history that a chair has been affiliated to the private sector. Another Ceva employee and swine flu expert, Kathrin Lillie-Jaschniski from Ceva Global Vet Services, is also on the management committee as one of two German representatives. At least two other Ceva colleagues will take part in ESFLU working groups. Currently, all other members of ESFLU come from public institutions such as research organizations and universities although it is anticipated that other members from the private sector will join in the future.

Swine flu, caused by the swine influenza A virus (swIAV), represents a major disease burden in pig production and also a pandemic risk: new variants, some with zoonotic potential, constantly emerge and infections in farms are becoming more persistent. The dynamics of swine flu virus evolution, spread and persistence in European pig farms is therefore a matter of concern for both animal and public health.

Despite this situation, swine flu surveillance is fragmented in Europe and current prevention and control measures are not sufficient. There is a clear need for coordinated generation of scientific knowledge and engagement of pig producers, field veterinarians, veterinary authorities, universities, the pharmaceutical industry and public health authorities to achieve better prevention and control.

Noting the lack of such coordinated effort in Europe, in 2021 Ceva led the development of a proposal for networking on swine flu, supported by a number of key European swine flu experts. This project was selected by COST in May 2022.

The overall objectives of ESFLU are to advance scientific knowledge concerning swIAV, improve disease surveillance and management capabilities, benefit pork production and reduce risks to both animal and human health.

**To achieve this it will:**

**> Facilitate data sharing and analysis for swIAV surveillance with national and international agencies, through harmonized methods and training, and thereby run pan-European studies of swine influenza virus circulation and evolution.**

**> Establish the network as the European counterpart of OFFLU[7] and support global surveillance and pandemic preparedness.**

**> Strengthen capability in Europe to detect, identify and characterize swIAV virus.**

**> Establish guidelines for swIAV management and control in pig herds.**

**> Promote dialog between stakeholders and inform policymakers and the general public on swine flu disease burden and the risks to public health.**






**The ESFLU network is currently composed of almost 100 experts from 23 countries and will take an interdisciplinary One Health approach.**

"One can expect the project to make a significant contribution to Ceva's One Health program and also to the development of the future generation of swine flu vaccines at Ceva."

**Gwenaëlle Dauphin**
SCIENTIFIC ACTIVITIES COORDINATOR - BIOLOGY

*(7) OFFLU is a network of expertise on animal influenza established jointly in 2005 by the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO) to support and coordinate global efforts to prevent, detect and control important influenzas in animals.*

# PREVENTATIVE HEALTH AND WELFARE

## Vaccination of poultry against Salmonella: a public health success story in UK and Europe with lessons for the USA




**In 1988 a British junior health minister, Edwina Curry, caused controversy when she said on a national news programme that: *"Most of the egg production in this country, sadly, is now affected with salmonella."***

She later clarified that she meant most of the flocks rather than most of the eggs – in fact the risk of an egg being infected was estimated at the time to be one in 200 million. However, her statement led to a collapse in the UK egg market: sales went down by 60% in just 10 days and millions of hens had to be slaughtered. Sales of eggs in the UK continued to decline by an average of 8% per year for the next 10 years, which was a disaster for the egg industry.

Curry's slip of the tongue led to her resigning her ministerial post but in fact there was widespread concern amongst public health experts about the risk of food poisoning caused by *Salmonella*, especially non-typhoidal *Salmonella*, in the UK. A report published in 1978 by the highly respected British Association for the Advancement of Science titled *Salmonella.* The Food Poisoner concluded that half of all outbreaks of food poisoning in the UK was attributable to poultry.

In 1985 the UK's Chief Medical Officer (CMO) noted that: "All stages in the chain that bring *salmonella* to man—farming methods, animal husbandry and transport, slaughter, food processing, retail and consumer practices—require attention in order to decrease or eliminate the *salmonella* load to which we are exposed" and later, in 1988, the CMO issued advise to consumers to avoid eating raw eggs.

This was followed by government legislation in 1989 which introduced compulsory monitoring and slaughter of infected flocks and thorough disinfectant of contaminated farms. However, the number of cases of non-typhoidal *Salmonella* continued to increase in the UK and also in the rest of Europe and globally. This continued an upward trend that had been apparent since the 1960s with a marked increased from 1981 onwards.

The turning point in the UK occurred following the introduction of a voluntary, industry-led initiative by the British Egg Industry Council (BEIC). From 1994 this required breeder flocks to be vaccinated against *Salmonella*. Under its Lion Mark code of practice, launched in 1998, vaccination of pullets that would go on to lay eggs stamped with the Lion Mark also became compulsory. In addition the code ensured that the vaccination programme was independently audited and that there was full traceability of eggs, hens and feed. At its peak in 1993, more than 18,000 human cases of *Salmonella* Endertidis PT4 (the dominant strain) were confirmed by laboratories. By 2010, this had dropped by 98% to just 459 cases.

A 2007 report published by the European Food Safety Authority included the results of an EU-wide survey of egg layer flocks. Some countries reported levels of *Salmonella* of public health significance in their flock holdings of more than 50%, while the UK figure was only 8%. By 2012, the level of *Salmonella* of public health significance in laying flocks in the UK had fallen to 0.07% and it remains very low.

In 2017, recognising the effective eradication of *Salmonella* of public-health concern from British eggs, the UK Food Standards Agency announced that it considered it to be safe for all but the most vulnerable people to eat raw and under-cooked eggs.

The revival of the Lion Mark stamp on UK eggs, which had been dropped in 1971, and associated marketing campaigns by the BEIC, helped to win over public opinion and sales of eggs increased from 9.8 billion in 1998 to 11 billion by 2009, and exceeded 13 billion in 2021. The latter was boosted at least in part by the success of television baking programmes and the popularity of home baking during Covid-19 lockdowns. Eggs stamped with the Lion Mark now account for 85% of the total UK egg market and 95% of eggs sold in the retail sector.

In 2003, the EU established a zoonotic disease control programme focused on controlling *salmonella* in poultry, setting reduction targets for salmonella in laying hens, broiler chickens and turkeys. Measures used include vaccination in some situations. This helped reduce cases of salmonellosis in the EU by half in the five-year period 2005-2009. The prevalence of egg laying flocks positive for any of the five serotypes targeted by the salmonella control programmes *(S. enteritidis, S. typhimurium (including the monophasic variant), S. virchow, S. infantis and S. hadar)* was 1.25% in 2019, slightly above the target of 1%.



# GLOBAL ERADICATION OF RINDERPEST: LESSONS LEARNED FROM KEY CAMPAIGN PARTICIPANTS

**On the 25 May 2011, the World Organisation for Animal Health (OIE) officially declared the global eradication of rinderpest, a viral disease of cattle and buffalo as well as many species of hoofed wild animals such as antelope, deer, giraffe, wildebeest and warthogs. Only one other infectious disease, the human disease smallpox, has been globally eradicated.**

With many of the people who led the successful rinderpest eradication programme now retired, Ceva has recently sponsored a project to record an oral or video record from these key participants. Professor William Taylor, a former advisor to the Pan-African Rinderpest Campaign, explained why this is important: *"It has to be done for posterity and the lessons that can be learnt from that can be transferred to other viral diseases."*

Rinderpest was a highly contagious viral disease that affected cattle, buffalo, sheep and goats, and cloven-hoofed wildlife in Africa, Asia and parts of Europe.

Following the introduction of the virus to Africa in 1887, most likely in infected cattle imported from India to present day Eritrea, a major pandemic of rinderpest raged in East Africa between 1887 and 1892. It wiped out virtually all cattle, buffaloes, elands and wild pigs in addition to many sheep, goats and antelopes. With the loss of draught oxen and pastoralists' cattle herds and the decimation of wild animals some estimates suggest that as a result of the pandemic up to two-thirds of the human population died of starvation and other causes in the worst affected areas. One chilling account describes the screams of starvation-weakened villagers being dragged from their huts at night by hyenas. Over a ten year period in the 1880s and 90s, rinderpest spread throughout Africa killing 90% of cattle, buffalo and related wild animals with devastating consequences for people. Earlier in this and the preceding century, recurring European pandemics led to the loss of around one-fifth of all dairy cattle and caused increased poverty and malnutrition.

The rinderpest eradication documentation project is still being finalized but Ceva tv's Nik Wood recently travelled the globe to meet up with some of the key actors in the eradication campaign. They shared their insights into the lessons learned from the campaign and the potential for further successes in the future – especially working towards the eradication of peste des petits ruminants (PPR). PPR is a disease that mainly affects sheep and goats and is caused by a virus closely related to the rinderpest virus.

Professor Taylor explained the critical components of the campaign: *"You have to know the epidemiology of the disease in the place that you are trying to eradicate from. Secondly, you have to have the tools with which to undertake the eradication. There's another thing that goes with that, and that is preventing the movement of infected animals, so there has to be a legislative background and there has to be adherence to legislation that says you do not trade in or move diseased and infected animals. The third thing is to have the money to back up the program that you're trying to undertake in a particular country."*

Jeff Mariner, of the Cummings School of Veterinary Medicine at Tuft University, USA added: *"It was developing this smart approach to vaccination. It was very targeted with specific epidemiological objectives. And then working with institutional arrangements between the public veterinarians, private veterinarians and the community animal health workers to get the job done."*

Commenting on the development of the safe and effective rinderpest tissue culture vaccine by the late Walter Plowright – for which he won the World Food Prize amongst other honours – his colleague Walter Masiga commented: *"That was the most important discovery that was ever made for rinderpest eradication and for the world of veterinary vaccines."*

A critical breakthrough was to develop a thermal stable form of the vaccine. This was done by Jeff Mariner who explained why this was so important: *"The existing [tissue culture] vaccine was an excellent vaccine. It generated lifelong immunity. It was protective against all the forms of rinderpest. It was very cheap. It was really ideal. It just needed to be kept cold and in large parts of the world, especially remote and insecure areas, infrastructure is a real problem, transport is a real problem, and these logistics really limit the access to healthcare, both human and animal, and greatly increase the cost. So, a product that can be used without this cold chain is actually much more flexible and much more appropriate in the developing world to increase access and impact of programmes."*

Looking ahead to how the lessons from rinderpest can be utilized in the future, John Anderson, former head of FAO's rinderpest world reference laboratory, suggested: *"Most of the good ideas that came out of the rinderpest eradication would be immediately appropriate for use in PPR. While we were working on rinderpest we developed a complementary diagnostic for PPR. So they exist, the vaccine exists – it's just a matter of the goodwill and getting people to collaborate properly and getting the funding."*

Michael Baron, honorary fellow, Pirbright Institute, added: *"You don't need massive technology to do this. You need a good vaccine. You need basic, simple diagnostics that are usable in countries where the diseases are endemic. And we have that for PPR…The third element is the veterinary services to deliver that."*

The Pirbright Institute, based in Surrey, England, aims to be the world's leading innovative centre for preventing and controlling viral diseases of livestock. The institute's director, Bryan Charleston, explained why the institutes new containment laboratory for research of exotic viruses, which became fully operational in April 2015 and is the culmination of a £145 million investment, was named the Plowright Building.

*"It was a very easy decision to name that the Plowright Building because it's an amazing achievement to eradicate a virus from the globe. A virus that caused a devastating disease of cattle. It is estimated that its eradication is saving the African economy USD 1 billion per year. It's through the invention of the vaccine using, at the time, state-of-the-art technologies to develop a new vaccine that resulted in the eradication of the pathogen from the globe. It's a fitting tribute to the person that initiated the control programme."*

**Walter Plowright died in 2010, just a year before the formal declaration of the eradication of rinderpest.**

**REPLACEMENT**
**REDUCTION**
**REFINEMENT**

**CEVA IS FULLY COMMITTED TO LIMIT THE USE OF ANIMALS.**

# CEVA'S NEW ETHICS AND ANIMAL WELFARE CHARTER

Ensuring the health and welfare of all animals is Ceva's fundamental mission. The research-driven products that Ceva develops and supplies significantly enhance the health and welfare of millions of animals throughout the world, reducing suffering and increasing wellbeing. Data processing, biochemistry, and cell and tissue culture are widely used in developing, testing and production of animal health products but currently regulatory requirements and the limits of scientific knowledge mean that the use of laboratory animals is still necessary.

For example, studies using laboratory animals are mandatory to demonstrate the product's effectiveness and safety for animals (in particular the absence of toxicity); its safety for humans, and in particular the absence of drug residues in products from treated animals intended for human consumption; and the absence of toxicity for the environment or other living organisms that may come in contact with the product or its derivatives.

Ceva is, however, fully committed to limiting the use of animals as much as possible.

When the use of laboratory animals is a scientific or legal necessity, Ceva strictly complies with all regulations and accepted standards on animal welfare, in particular by its universal application of the 3 Rs rule:

**Replacement, Reduction and Refinement.**

- **REPLACEMENT:** Limiting the use of animals. Animals are used when no recognized alternative exists, and only in compliance with regulatory requirements for the registration of medicinal products or the release of batches of vaccines intended to protect domestic animals.
- **REDUCTION:** Limiting the number of animals used, and the number of studies performed.
- **REFINEMENT:** Continually seeking to refine procedures using animals, and determine endpoints for stopping procedures on an animal.

**CEVA LIBOURNE CAMPUS FRANCE**

GLOBAL LABORATORY, CEVA GROUP

## More specifically, through its Charter, Ceva commits to comply with the following principles:

1. Care of animals is the most important concern in studies/ tests/ antigen production using animals. All animals used in studies/tests/ antigen production for Ceva must be under the strict care of a veterinarian.

2. The highest handling standards, the most advanced scientific equipment and environmental enrichment must be used for all species of animals involved.

3. Ceva actively supports and develops alternative research methods and uses these technologies, wherever possible.

4. Animals used in biomedical research are raised and come from well-identified and approved sources.

5. Ceva commits to respect the 3R's:

**REDUCTION:** Use the absolute minimum number of animals necessary to obtain reliable results in accordance with regulatory requirements.

**REPLACEMENT:** Use of animals in studies/ tests/ antigen production are authorized only when no other alternative solution is known or when those are not recognized by regulatory authorities.

**REFINEMENT:** Use of methods that minimize the pain, suffering, distress, or lasting harm that may be experienced by animals used in studies/ tests/ antigen production, and which improve their welfare.

6. All experiments using animals under our care must be presented to an Ethics Committee (internal to Ceva or external party) to ensure that the use of animals is consistent with the principles established in this Charter. No experiment is allowed to start without the authorization of the Ethics Committee.

7. No experiment or study involving animals should be repeated unnecessarily. Any repetition must be first critically reviewed and approved by the Ethics Committee.

8. Employees handling animals must be specifically trained in compliance with legal requirements and the highest standards of best practice.

9. Ceva requires all its external partners, including subcontracting companies and suppliers, to apply the principles of this Charter and will not sign any contract with a partner who has been identified as not complying with these ethical principles.

In February 2021, as a member of the SIMV, the French association for animal health industry, Ceva became a signatory of the Transparency Charter on the use of animals for scientific and regulatory purposes.

The signatories of this Charter recognize that animals are living beings endowed with sensitivity and also that every citizen has the right to access comprehensive, clear and accurate information. This includes the reasons and conditions for the use of animals for scientific or regulatory purposes, but also the regulatory framework that guides this use, as well as the scientific and medical progress that result from it.
In addition to being a member of SIMV, Ceva is also a leading member of the non-profit organizations Health for Animals and Animal Health Europe, all of which work to protect animal health and ensure that treatments do not negatively affect animal welfare.

In 2021, Ceva joined an international think tank focusing on ways to reduce the use of animals for purposes of the registration and production of veterinary vaccines.

To further this shared approach, Ceva is also working with other partners, including the European Commission, on the European Union platform on animal welfare. Ceva is working to change regulations in this area, so as to better guarantee animal welfare and reduce the use of animals.

Also in 2021, Ceva published its Ethics and Animal Welfare Charter. As long as regulatory authorities, worldwide, mandate the use of animals to ensure quality, efficacy and safety of animal health products, the company commits to keeping all animals under their direct supervision or through approved contractors with the utmost care for their health and welfare.

In addition to regulatory authority's inspections, Ceva regularly audits its external partners. In case of breaches of the principles of this Charter, investigations will be conducted and any identified breach will lead Ceva to terminate the relationship if immediate corrective actions are not taken.

**CEVA PHYLAXIA CAMPUS HUNGARY,** CEVA'S LARGEST VACCINE PRODUCTION CENTRE.


# CEVA EXPERTS HELP DRIVE EU PROJECT TO END ANIMAL TESTING OF VACCINES

**With the global rollout of Covid-19 vaccinations making headline news throughout the world, interest in the safety and efficacy of vaccines has never been more intense. Within Ceva, however, the importance of quality control of vaccines has always been a very high priority. And over the past 6 years, Ceva's expertise in innovative approaches to quality control of vaccines has been central to a collaborative European project to develop and make available alternatives to animal-based testing.**

Prior to marketing, all batches of vaccines are submitted to release testing to ensure they are safe and effective. Until now, in the case of vaccines against clostridial infections, these essential and mandatory tests have been routinely performed using laboratory mice in the absence of any validated alternatives. This means that hundreds of thousands of mice are used for this purpose each year in the EU alone, which is costly and raises significant welfare and ethical issues beside the drawbacks linked to animal-based assays (assays of this type produce results with a high variance, due to variation between individual animals and so are far from being ideal).

Because of the very high number of mice used to test clostridial vaccines, this group of vaccines was considered a 3Rs (replace, reduce, refine) priority by the European Partnership for Alternative Approaches to Animal Testing (EPAA) - a collaboration between the European Commission and the European pharmaceutical industry – and the Council of Europe through its European Directorate for the Quality of Medicines & HealthCare (EDQM, formerly known as the European Pharmacopoeia).

These organisations jointly sponsored a project, run by the EDQM in the frame of its Biological Standardisation Programme (BSP) as 'BSP130' project, which was launched in 2013 and held its closing event in March 2021.
Since 1991, the mission of the BSP, coordinated by the EDQM and co-sponsored by the Council of Europe and European Commission, includes finding and making available alternative methods for the quality control of biologicals in order to apply the 3Rs concept to the use of animals in laboratory experiments.

From the start of the project, the role of Ceva, both as a participant laboratory and as an industrial sponsor took several forms. Botond Siklodi, Ceva's Analytical Methods Transfer Platform Manager, was co-project leader for BSP130 during its third and final phase. Other scientists based at the Ceva Phylaxia Campus in Budapest, including Balazs Dalmadi and Laszlo Kiss, played leading roles in in vitro assay design and development. The company donated study materials and pretested, conditioned, packaged and shipped all the toxoids and toxins included in the study panel. Ceva's project team also contributed to the numerous project workshops and meetings that took place in Brussels, Egmond aan Zee and Strasbourg, to the closing event in March 2021 (https://www.edqm.eu/en/proceedings-international-conferences#3R) and to the drafting of scientific publications and workshops proceedings.

*"The main goal of the BSP130 project was to apply the 3Rs concept for in process QC vaccine testing by developing and validating in vitro methods to replace the currently used animal tests. In fact, the methods developed and validated during the project actually outperformed the previously used mice tests and demonstrated advantages in terms of precision, reliability, time taken and cost, as well as animal welfare. The project also enabled Ceva to demonstrate its expertise in clostridial vaccine development and production, and quality control methods, and we clearly established Ceva as a market leader in clostridial vaccines."*

Besides developing and making available in vitro testing methodologies for clostridial vaccines, the BSP130 project now represents a best-practice model for running other in vitro replacement assay validations. However, as Botond, emphasizes: ***"International validations of newly developed in vitro alternative assays are big projects and need sufficient resources and support from inter-governmental organisations, governments and industry. But, as this project shows, with sufficient resources, the participation of dedicated teams of experts and trust amongst project partners – including between potential competitors – the rewards can be considerable."***

**Botond Siklodi**
ANALYTICAL METHODS TRANSFER PLATFORM MANAGER

# CEVA AND THE WORLD VETERINARY ASSOCIATION CELEBRATE OUTSTANDING PEOPLE AND INSTITUTIONS IN 5TH GLOBAL ANIMAL WELFARE AWARDS

In 2021, the Global Animal Welfare Awards, awarded for the fifth year through a collaboration between the World Veterinary Association and Ceva, were a little different. Due to the ongoing coronavirus pandemic the winners were announced during an online event. In addition, two new award categories were created, one for veterinary technicians and nurses, and the other for veterinary schools. Once again, however, the awards recognized, celebrated and rewarded people and institutions for their dedication and outstanding work going 'above and beyond' to protect and safeguard the welfare of animals and promoting the animal welfare concept and approach in their daily life.
The official in-person award ceremony was finally held in March 2022 in Abu Dhabi, UAE during the 37th World Veterinary Association Congress.

## THE WINNERS WERE:

### ANIMAL WELFARE AWARD FOR VETERINARIAN FROM EUROPE: DR AXEL KORNERUP HANSEN | Denmark

Professor Axel Kornerup Hansen has been deeply engaged in veterinary care of laboratory animals since 1987. His work has included improving laboratory animal housing and the way in which laboratory animals are handled.

In 1997 he became a professor in laboratory animal science and welfare at the University of Copenhagen School of Veterinary Medicine. In addition to improving the organisation of the veterinary use of research animals, he built up a major teaching system, which today is probably the largest of its kind in the world.





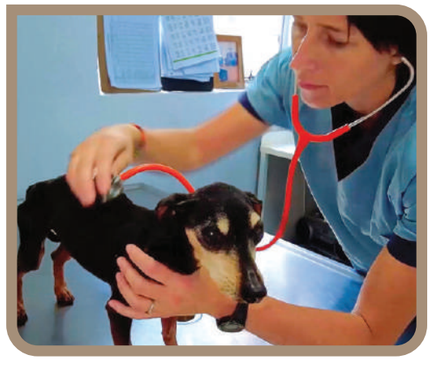

### ANIMAL WELFARE AWARD FOR VETERINARIAN FROM ASIA & OCEANIA: DR VIJITHA PERERA | Sri Lanka

Dr Perera works as a wildlife veterinarian at the Department of Wildlife Conservation in Sri Lanka. Operating with a dedicated team, he deals with all types of animals from endangered pangolins, to wild cats and elephants that are injured in the wild or areas of conflict.

### ANIMAL WELFARE AWARD FOR VETERINARIAN FROM AFRICA: DR CARYN RADEMEYER | South Africa

Dr Rademeyer has promoted animal welfare throughout her numerous responsibilities as a veterinarian working across the species in South Africa and has devoted much of her career to animal welfare education.

She has also worked tirelessly with organisations such as the People's Dispensary for Sick Animals in Soweto, Johannesburg, supporting people who cannot afford simple medical care for their animal. She is also a regular volunteer at the Highveld Horse Unit, South Africa's largest equine organisation.



## ANIMAL WELFARE AWARD FOR VETERINARIAN FROM THE MIDDLE EAST: DR WADIMA MATAR AL DHAHERI | United Arab Emirates

Dr Al Dhaheri has been an advocate for animal welfare since she was qualified as a veterinarian in the United Arab Emirates. She has joined various non-governmental organisations, giving help to treat stray, abandoned or injured animals in her own country.

She also volunteered for the Cheetah Conservation Fund in Somaliland in 2018 where she provided care for orphaned cheetah cubs. She had to monitor rescued cubs continuously, and feed, medicate and run minor tests on animals with the few resources she had.

## ANIMAL WELFARE AWARD FOR VETERINARIAN FROM NORTH AMERICA: DR JIMMY TICKEL | USA

Dr Tickel is the livestock emergency management subject matter expert at the Institute for Infectious Animal Diseases (IIAD) at Texas A&M University. His expertise is specifically sought after for issues related to emergency management on both national and international levels.

Over the years, Dr Tickel has honed his focus on addressing animal welfare issues while leading responses to numerous natural disasters, including hurricanes and disease outbreaks.

## ANIMAL WELFARE AWARD FOR VETERINARY NURSE: DEBBIE WHITTEN, BIRMINGHAM, ALABAMA | USA

Ms Whitten is a licensed veterinary technician currently employed as a Research Assistant, at the University of Alabama at Birmingham, Department of Ophthalmology.

She is an active member of the National Association of Veterinary Technicians in America and from 2011 to 2017 served on the AVMA Committee on Veterinary Technician Education and Activities (CVTEA), which is the U.S. accrediting body for educational programs in veterinary technology.





## ANIMAL WELFARE AWARD TO A VETERINARY SCHOOL: UNIVERSITY OF VETERINARY MEDICINE, HANNOVER | Germany

**The University of Veterinary Medicine of Hannover has been a pioneer in animal welfare and research for many years both in Germany and neighbouring EU countries.**

**The University has also been a leader in the development of alternative and complementary methods to animal experimentation and established the first national centre for this discipline in 2009. Since 1981, the University has been organising the annual conference "Current Problems in Animal Welfare".**

## ANIMAL WELFARE AWARD FOR A STUDENT: ANA PASCAUD | France

**While studying at the Nantes-Atlantic National College of Veterinary Medicine in France, Ana designed a special application to monitor the health and welfare of dolphins at the Planète Sauvage zoological park in Nantes.**

**Today, as a young veterinarian, Ana continues to develop and to apply animal welfare techniques in the veterinary clinic where she works.**


# CEVA PARTNERS WITH UNIQUE HUMAN HEALTH PLATFORM TO ADVANCE ONE HEALTH APPROACH TO CARDIAC DISEASE

**In late December 2021, Ceva announced a new partnership with the L'Institut de Rythmologie et modélisation Cardiaque (Liryc - the Institute of Rhythmology and Cardiac Modelling), the world's leading institute dedicated to treating heart rhythm diseases, such as atrial and ventricular fibrillation and heart failure.**

Since 2012, Liryc's aim has been to transfer knowledge acquired in the understanding of cardiac arrhythmias and desynchronizations to develop new technologies that will be made available to clinicians. Liryc's uniqueness lies in bringing very diverse and complementary multidisciplinary scientific expertise together with world-class clinical teams in one place, with the ultimate objective of providing better care to patients.

The new partnership between Ceva and Liryc, both of which are based in the Nouvelle-Aquitaine region of France, reflects a common desire to create synergies in the search for innovative medical solutions in cardiology for both human and animal health, as part of a broader One Health approach. The partners plan to promote a platform of exchanges dedicated to cardiology, stimulating research and medical innovation at the interface between humans and companion animals.
Financial support provided by Ceva as part of the partnership agreement makes the company one of the top five donors to Liryc.
Liryc is one of the seven university-hospital institutes (IHU; Instituts hospitalo-universitaires) created by the French government as part of the Investments for the Future Program. The aim of the IHUs is to create centres of excellence in France to foster medical research and innovation.

Commenting on the new partnership, Professor Pierre Jaïs, Executive Director of the IHU Liryc, said:

***"We are proud to count on the major support of Ceva Santé Animale, an economic flagship of the Nouvelle-Aquitaine region. Getting closer to Ceva is also an opportunity for the institute to join the One Health dynamic and thus broaden our vision of medicine and research."***

Ceva's partnership with Liryc includes supporting an annual 'New insights in cardiology' meeting to share innovations, new developments and research in human and veterinary cardiology and to identify possible synergies. The first meeting was held in early 2022. Amongst the topics covered was cardiac modelling, an area where there are clear possibilities for closer collaboration and synergy between Ceva and Liryc.

Although the partnership between Ceva and Liryc is new, it builds on Ceva's ongoing commitment to bring together veterinary researchers and practitioners with their colleagues from human medicine. Since 2009, Ceva has hosted a series of Human Veterinary Cross Talk Symposiums to explore and promote synergies between animal and human health in the fields of cardiology, nephrology and hypertension. In fact the 5th Cross Talk Symposium in Cardiology – 'Two hearts that beat as one' taking place on September 23, 2022 – will be held at the Liryc campus, clearly demonstrating Ceva's commitment to the new partnership.

As Marc Prikazsky explained during the last symposium, held in Milan in 2019 and focused on 'New Perspectives on Diuretic Treatment: ***"Initially we had hoped that exposing our veterinary colleagues to the work being done by their counterparts in human medicine would stimulate new ideas, solutions and approaches that could benefit companion animals. This has now gone to the next stage as our colleagues in human medicine have been stimulated by and learnt from the work done by veterinarians. This really is One Health in action."***

Innovation is critical to the success of Ceva. Over the past 15 years, and thanks to the tireless work of Ceva teams and partners around the world, Ceva has emerged as a major player in veterinary cardiology, nephrology and hypertension.

# ONE PLANET

# 2022

## The world has never been hungrier

**The latest edition of the United Nation's State of Food and Nutrition in the World (SOFI) [8], published in July 2022, paints a grim picture that shows the world is hungrier than ever.**

In 2021, 828 million people went to bed hungry every day - an increase of almost 150 million since the start of the Covid pandemic. An additional 135 million were facing acute food insecurity and 50 million were on the edge of famine. 2.3 billion people were moderately or severely food insecure and 3.1 billion people (4 out of every 10) were unable to afford a healthy diet which exposes them to a a vicious circle of malnutrition, ill health and poverty.

Experts at the UN's World Food Program (WFP) believe these numbers will increase over the coming months. They identify four key drivers: conflict, especially in Ukraine, climate change, economic consequences of Covid-19 and increasing food costs. Compared to 2019, WFP is paying 30% more for the food it has to buy to feed the 152 million people who will depend on the program for their survival in 2022.

In its latest bulletin, the WFP states that: "To avert the hunger catastrophe the world is facing, everyone must step up alongside government donors, whose generous donations constitute the bulk of WFP's funding. Private sector companies can support our work through technical assistance and knowledge transfers, as well as financial contributions. High net-worth individuals and ordinary citizens alike can all play a part, and youth, influencers and celebrities can raise their voices against the injustice of global hunger."

One of Ceva's major business objectives is to help feed the world's growing population. With a specific focus on preventive health, Ceva's innovative vaccines and other animal health products help to ensure poultry and farm animals remain healthy and productive, maximizing production of nutrient-rich meat, milk and eggs whilst protecting biodiversity and the environment for the future.

Beyond Ceva's commercial activities, the company, its staff and customers also come together to support direct action to help ensure vulnerable families can access safe, nutritious food, especially eggs which are protein and micronutrient rich, versatile and convenient. Below, some examples of Ceva's approach are described, including how ongoing programs were adapted in the face of the Covid pandemic.


**Marc Prikazsky writes: The United Nation's World Food Day offers an annual opportunity to pause and reflect on the present state and possible future of food. The brochure[9] produced by FAO to promote World Food Day 2021, which is on the 16 October, includes some stark statistics that describe the sorry state of the world's current food systems (see FAST FACTS box).**

It is shocking that around 4 out of every 10 people on Earth cannot afford a healthy diet. Throughout the world, for most people, and for the foreseeable future, I believe that a healthy diet includes, and will continue to include, regular meals that contain nutrient-rich meat, milk, eggs or fish alongside staple foods such as cereals, roots and tubers, and pulses plus vegetables and fruits.

In a recent opinion piece[10], ILRI's Susan MacMillan wrote: ***"We have no time, no wiggle room, left for free passes in a globalised world where actions (or lack of actions) in any one nation can so readily affect us all. Like every other sector, livestock systems have to improve-they have to become safer, greener and more humane as well as profitable. And of course those with greater resources will have to support those with fewer. We're all in this together. The only way out is also together."***

I share Susan's sense of urgency and Ceva wholeheartedly embraces the idea that we are all in this together. By helping the world's livestock farmers keep their animals healthy and supporting them to produce meat, milk and eggs in ways that are safer, greener and more humane, as well as profitable, Ceva continues to live up to its Together, beyond animal health strapline.

Together with our passionate people - employees, customers, partners and competitors - we look forward to the day when, in not-too-distant future, World Food Days showcases a world where everyone has access to enough affordable, nutritious and safe food – including, if they choose, regular meals based on meat, milk, eggs or fish.

## FAST FACTS

More than **3 billion** people (almost **40 percent** of the world's population) **cannot afford a healthy diet.**

**Smallholder farmers produce** more than **33 percent** of the **world's food,** despite challenges, including poverty and a lack of access to resources including finance, training and technology.

**14 percent** of the **world's food** is **lost** due to inadequate harvesting, handling, storage and transit and **17 percent** is **wasted** at consumer level.

Almost **2 billion** people are **overweight or obese** due to a poor diet and sedentary lifestyle. Related health-care costs could exceed USD **1.3 trillion** per year by **2030.**

Globally, **20 percent more women** than men aged 25–34 live in **extreme poverty,** and more than **18 percent** of **indigenous women** live on less than USD **1.90 a day.**

**55 percent** of the world's **population** resides in **cities** and this **will rise to 68 percent** by **2050.**

The world's **agri-food systems** currently **employ 1 billion** people, more than any other sector.

The **world's food systems** are currently responsible for more than **33 percent** of global anthropogenic greenhouse **gas emissions.**

**10 percent** of people are affected by **unsafe food supplies** contaminated by bacteria, viruses, parasites or chemical substances.

> In a recent opinion piece , ILRI's Susan MacMillan wrote:
>
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>
> Susan MacMillan
> ILRI

*(8) https://www.wfp.org/publications/state-food-security-and-nutrition-world-sofi-report-2022*
*(9) http://www.fao.org/3/cb5506en/cb5506en.pdf*
*(10) https://sdg2advocacyhub.org/news/tables-future*

EGG A DAY PROGRAM
ARGENTINA

# CEVA ARGENTINA'S EGG A DAY PROGRAM: CRACKING CHILD MALNUTRITION WITH AN EGG A DAY


*CEVA ARGENTINA HAS REACHED AROUND*
***1500 CHILDREN AT RISK FROM MALNUTRITION***

In 2012, Ceva Argentina staff and management were shocked to learn that the mortality rate for children up to 5 years old in their relatively wealthy country was 13%, more than triple that of France, and that malnutrition was all too common. This prompted them to take direct action to help improve this dire situation by exploiting the nutritional qualities and convenience of eggs. Since many of their major customers were large-scale egg producers, and vaccines and other medicines for poultry are a major focus of Ceva's business, this initiative had a good fit with their commercial activities.

Since 2012, Ceva Argentina has reached around 1500 children at risk from malnutrition, providing them with approximately 576,000 eggs through their 'egg a day' program. More than 10 years later, the egg a day program is ongoing and Ceva looks forward to supplying more than one million eggs.

In addition to supplying eggs, Ceva has supported 250 face-to-face classes on how to cook eggs combined with nutritional information for mothers of at-risk children. This approach has extended the direct reach of the program to around 10,500 people from poor and vulnerable families with the use of social media extending the reach even further.

Other organisations, including six major Ceva customers involved in egg production and also a trade body, Cámara Argentina de Productores Avícolas (CAPIA - the Argentine Chamber of Poultry Producers), have been inspired to replicate Ceva's initiative increasing the number of children reached as well as the geographical coverage of the 'egg a day' program. For example, CAPIA donated 180,000 eggs during 2015.

Eggs are supplied through the 23 sites run by the Centres for Child Nutrition (CONIN), a not-for-profit foundation which aims to prevent and cure malnutrition, especially amongst poor families with young children.

The whole Ceva Argentina team has been given the chance to become involved as were customers; for example, for every vaccine order received, Ceva Argentina donates an additional 50 eggs to CONIN and every year, Ceva volunteers visit the CONIN centres they work with to help out with practical maintenance tasks.

C OUR FUTURE
ASIA


# C OUR FUTURE: CAMPAIGNS ACROSS ASIAN COUNTRIES TO TACKLE STUNTING OF CHILDREN THROUGH INCREASED ACCESS TO EGGS AND CHICKEN MEAT

**In 2018 Ceva's young millennial managers from nine Asian countries were challenged to design a corporate social responsibility project. After doing their research, the group focused on stunting in children. They were surprised to learn that, despite rapid economic development in the region, one in five children in Asia suffered from stunting (that is children who are too short for their age caused by chronic or recurrent malnutrition) and globally more than half of all stunted children live in Asia. As well as being short for their age, stunted children fail to develop both physically and mentally.**

The young managers learnt that low protein consumption in daily diets was a major cause of stunting and they realised that chicken meat and eggs are ideal foodstuffs to provide these vital missing nutrients. Since a major focus of Ceva's work in the region is supporting poultry farmers there was clearly a good fit between their 'day job' and the goal of tackling stunting in children. The group therefore launched a major campaign under the name 'C our Future'.

The campaign has its own website with hard-hitting and eye-catching content, specially-made videos and graphics, and links to authoritative sources of information, and also country specific pages.

The campaign explains that "Child stunting is an endless cycle. Let us break the cycle and make a difference together!" It goes on to urge: "Let's embrace chickens and eggs together! They are affordable yet empowering high-quality protein to build a better future for our children!"

The programme initially launched in 2019 in China, Indonesia, Malaysia and Thailand, and more recently has been extended to include Philippines, Vietnam, Taiwan and India. Between 2019 and 2022, across the 8 Asian countries, a total of 348,500 eggs were donated with 3,284 children who were stunted or at risk of stunting benefiting. As importantly, the accompanying social media and educational campaigns raised awareness about the nutritional value of eggs and chicken meat, and their potential to tackle child malnutrition.

In Indonesia, Ceva worked with the local government in the sub-district of East Bogor to monitor the impact of regular consumption of eggs on health, especially incidence of stunting, in at-risk children. In this program, 85 vulnerable children were given two eggs a day for a period of six months (October 2021 - April 2022).

At the end of this period, the progress of their health status was assessed by a team of health professionals who concluded that the program had had a significant positive impact on the children's development. Following this pilot program, the local government plans to roll out the initiative to other sub-districts.

The C our Future campaign adapted quickly to the global coronavirus pandemic. For example, in 2020, in Malaysia, the government's response included lockdowns, known locally as movement control orders (MCOs). The impact of these orders, which forced businesses to close and restricted movement of people, was felt particularly by the most underprivileged Malaysians. This included those with little or no assets or savings to fall back on, informal workers and those who had lost their jobs, been placed on unpaid leave, or experienced pay cuts. Many of these categories have fallen between the cracks of Malaysia's social protection network.

When the first MCO was announced in March 2020, initially there was very strong local demand for eggs as panic buying led to empty shelves in supermarkets. However later, when neighbouring Singapore went into a 'circuit breaker' in April 2020, the market for Malaysian eggs collapsed. Singapore usually imports around three-quarters of its eggs from Malaysia, worth around USD 100 million annually to the Malay economy.

The enforced closure of local restaurants and hotels in Malaysia also severely impacted on demand for eggs. Responding to this situation, The Lost Food Project, together with Ceva Animal Health Malaysia and local poultry producers, stepped up resulting in the contribution of 100,000 eggs, which helped keep 17,000 vulnerable beneficiaries nourished during this difficult time.

# THE GOLDILOCKS DIET: NOT TOO LITTLE MEAT, NOT TOO MUCH – JUST THE RIGHT AMOUNT

**In a classic British fairy tale, the young, golden-haired, female protagonist, Goldilocks, enters a house belonging to a family of bears – mother, father and baby – who are mysteriously absent. She tries in turn each member of the bear family's bowls of porridge, chairs and beds. In each case she judges one to be too cold/small, one to be too hot/big, but one to be just right. Subsequently, the Goldilocks principle – not too little, not too much, just the right amount - has been applied in science, economics, engineering, business and other fields.**

Living to 83 on average, today the Japanese have one of the world's highest life expectancies. This fact is often ascribed to their diet, which is widely believed to feature large amounts of fish – think sushi and sashimi. But the truth is actually more complicated and surprisingly the relatively recent addition of meat to their diets may be the key to their good health and long lives.

For twelve centuries, meat eating in Japan was largely banned and the diet of the average Japanese person was often nutritiously poor, at times consisting of just a little rice, other coarse grains and acorns with very little protein.

This was the situation as recently as the Second World War. Japan, which was heavily dependent on imported food, suffered more from hunger than almost any other war-affected country.

After the war, prosperity in Japan rapidly increased and there was a major shift from rural to urban living. Post-war American food aid also introduced a wide range of new foods, including meat and dairy, to a new generation through a school lunch program. Western fast foods also became popular: today Japan has more MacDonald's outlets than any other country except the United States . As a result, meat consumption in Japan started to rise: from almost nothing in 1960 to 52 kg per capita by 2013, which is still less than half the amount consumed in the United States [11].

At the same time as meat consumption increased, longevity began to increase in Japan. In 1970, life expectancy was merely average for OECD countries. Although rates of cancer and heart disease were relatively low, Japan had the highest frequency of cerebrovascular deaths – strokes – amongst any OECD country. Between 1970 and 1990, rates of cerebrovascular deaths fell to the OECD average and as a result Japan rose rapidly up the global longevity league table; today Japanese people are amongst the longest lived in the world.

In a recent article in the Economist newspaper [12] , Tsugane Shoichiro of the National Cancer Centre in Tokyo proposed the theory that some meat and dairy may be needed to keep blood vessels robust (and prevent strokes), though not so much that those vessels get clogged.

A major study recently published in the UK [13] seems to support this idea: compared to meat eaters, vegetarians had higher rates of stroke.

In a recent newsletter from the International Livestock Research Institute, Hank Fitzhugh, adjunct professor and senior fellow at the Borlaug Institute for International Agriculture, Texas A&M University and a former director general of ILRI, neatly summarised this as the'Goldilocks diet': not too much, not too little, but just the right amount of animal-sourced foods for healthy living.

*(11) List of countries with McDonald's restaurants - Wikipedia*
*(12) Japanese people may have gained longevity by balancing their diets | The Economist*
*(13)Risks of ischaemic heart disease and stroke in meat eaters, fish eaters, and vegetarians over 18 years of follow-up: results from the prospective EPIC-Oxford study | The BMJ*



# CRACKING THE SHORTAGE OF QUALITY DAY-OLD CHICKS IN AFRICA

**Ceva has teamed up with private sector partners and investors in two initiatives to improve the supply of healthy and productive day-old chicks to small- and medium-sized commercial poultry farmers in Sub-Saharan Africa.**

Although the number of large-scale commercial broiler producers in Africa is increasing, still the vast majority of the continent's chickens are kept by small-scale traditional farmers who operate low (or no) input-low output systems. With rapidly increasing demand for poultry meat throughout Africa, driven by population increase, urbanization and increased incomes, there is an emerging opportunity between these two extremes for a new type of small- to medium-scale commercial producer.

The entrepreneurs who establish or would like to establish these small- to medium-sized poultry enterprises are faced, however, with a number of major challenges. Foremost amongst these are the threat from infectious diseases and limited access to high-quality day-old chicks.

Unlike traditional systems, in which chickens are allowed to range freely and breeding is uncontrolled, small to medium-scale commercial chicken meat producers need to practice batch rearing. This means that batches of young chicks are housed and reared as a group until they are ready for slaughter, when the chicken house is emptied and cleaned before the next batch of chicks arrives. Batch rearing requires that the farmers practice a minimum level of biosecurity including good hygiene as well as vaccination to prevent the major infectious diseases. Failure to do so exposes the farmers to diseases such as Newcastle diseases, which can wipe out whole flocks.

Throughout most of Sub-Saharan Africa there is limited access to high-quality day-old chicks, especially in more remote rural areas. Although local breeds reared in traditional free-ranging systems can breed naturally and produce offspring that have the tasty and firmer textured meat that many local consumers prefer, birds reared in this way are very unproductive: the hens lay few eggs, mortality rates due to predators and diseases are very high, especially for the young chicks, the chicks grow slowly taking 6 months or more to reach slaughter weight, and the carcass weights are low, just 1 kg or less.

To address these challenges, since 2015 Ceva received grants from the Bill & Melinda Gates Foundation to work on two initiatives.

The first collaboration was based in Burkina Faso, West Africa. Here, the solution was to develop a new cross-bred chicken – known as the Poulet du Faso - that retained the taste and texture characteristics of local Burkinabe birds, but could be produced under local conditions in ways that were far more productive.

Local cockerels and hens are reared in a specially built facility, the Avian Selection Centre (the only one of its kind in Sub-Saharan Africa), where they receive excellent food and health care in an environment that met the needs of both birds and the people who cared for them. Careful records are kept to prevent inbreeding and identify the most productive birds. Within each generation, the best performing birds are selected and retained for breeding. After the first generation, the centre has been run as a closed flock to avoid the risk of introducing infections.

The elite cockerels – Coq du Faso – that are produced are then sold to breeding farms and hatcheries where they are crossbred with hens of a breed developed in France for the free-range meat market (SASSO SA51).

ONE PLANET - SUSTAINABLE AGRICULTURE

# Prevent


Marie Ducrotoy, Senior Manager Development Projects and Partnerships and Ceva's lead for the project commented:

***"The PREVENT project will make the latest technological innovations, such as hatchery vaccinated day-old chicks and technical support available to small-scale poultry farmers across Sub-Saharan Africa. This will strengthen and broaden poultry production in rural areas, enhancing the capacity of smaller farmers to respond to the enormous challenge of producing enough high-quality protein to meet the needs of Africa's rapidly growing population."***

**Marie Ducrotoy**
MANAGER DEVELOPMENT PROJECTS AND PARTNERSHIPS, CEVA SANTÉ ANIMAL

The resulting eggs are hatched in hatcheries and the day-old chicks vaccinated against Newcastle disease using Ceva's innovative vaccine. The chicks are then reared by more able local farmers who can provide the care and conditions the vulnerable young chicks need in 'mother units'. Finally, at 42 days of age, the now hardy 'teen' chickens are sold to other farmers who continue to rear the birds until they reach slaughter weight: Poulet du Faso attain a slaughter weight of 1.1 kg in 10-12 weeks, compared to 24 or more weeks for local birds under traditional management.

The resulting chickens retain the appearance and eating qualities of local birds and are marketed under the Poulet du Faso brand, which has rapidly become known, trusted and sought after. Traceability is achieved all along the value chain through the use of wing tags, attached to all Poulet du Faso chicks, that features the brand's logo and a unique identification number. The tags are a guarantee to the farmers that the birds have been effectively vaccinated at the hatchery.

From the outset, care was taken to ensure all stages of the Poulet du Faso's production was undertaken using sound business principles. Also, steps were taken to ensure that opportunities created by the initiative were open to all, not just wealthier farmers and entrepreneurs, for example by subsidizing the first batch of day-old chicks.

The original objective was to produce one million Poulet du Faso a year. This objective was exceeded with 4.5 million birds being produced in the three years to 2021. Demand for Poulet du Faso quickly exceeded supply so, in addition to the original breeding farm and hatchery, five additional breeding farms and hatcheries have been signed up and it is anticipated that production will reach 3.5 million birds a year by 2025.

The Poulet du Faso model has also attracted attention from entrepreneurs in neighbouring countries and similar initiatives are now underway in Togo, Senegal and Mali. Meanwhile, in Burkina Faso, the Poulet du Faso value chain now operates as an interconnected series of sustainable and profitable businesses, entirely independent of the project.

The second collaboration between Ceva and BMGF is taking a different approach to increase the supply of high-quality day-old chicks. Working together with GALVmed, a not-for profit livestock health product development and access partnership, the partners have recently launched the PREVENT program – short for PRomoting and Enabling Vaccination Efficiently, Now and Tomorrow.

This ambitious 4-year project aims to help 150,000 small-scale poultry producers in Africa to become more productive and efficient by building their businesses and overall sustainability. The PREVENT project will see more than 50 million hatchery-vaccinated day-old chicks distributed annually. It will work with around 40 medium-sized hatcheries spread across eight African countries. The project will enable the hatcheries to provide high-quality, vaccinated day-old chicks to small-scale producers together with practical advice and guidance from a team of field technicians. Previously, these hatcheries did not vaccinate chicks leaving farmers to do this themselves or take the risk and leave them unvaccinated.

To date, the effectiveness of poultry vaccination in Africa has been limited. High temperatures hamper distribution of vaccines, which mostly need to be kept cold. Combined with lack of information about circulating infectious diseases and limited access to vaccines, rural producers can have their flocks and livelihood wiped out overnight.

By providing small-scale producers with better quality chicks, which are already effectively protected from the major infectious poultry diseases before they arrive on the farm, together with improved flock health and husbandry advice, the project aims to cut waste and make poultry production across the target countries much more sustainable.

To date, major animal health businesses, such as Ceva, have focused their vaccine marketing efforts on large-scale hatcheries. This project will enable Ceva, which is co-funding the project, to expand its focus to include small to medium-sized hatcheries and therefore extend the benefits of rearing hatchery-vaccinated chicks to many more small-scale poultry producers.

Today, the absence of local technical support is also a major block to improving the efficiency of poultry production. In the PREVENT program, field technicians will serve as the link between the hatcheries and producers; as well as providing advice and technical support, they will also distribute vaccinated chicks to smaller-scale producers giving them equal opportunity to grow their businesses.

The project plans to be gender intentional by aiming to have women actively participate in 60% of the small-scale poultry enterprises targeted. Also, the large-scale and geographically dispersed nature of the project will offer unprecedented levels of access and insight into the emerging commercial poultry sector in Africa. It is hoped that the information generated and shared by the project will encourage other businesses, such as feed, genetics and equipment suppliers to invest and support the sector.

# NO EASY ANSWERS: LIVESTOCK'S ROLE IN ENABLING HEALTHY AND SUSTAINABLE FUTURES FOR ALL

## *ANTI-LIVESTOCK SENTIMENT* ***THREATENS HEALTH OF WORLD'S POOREST***

**In an op-ed published by The Guardian newspaper on 10 September 2021[14], an award-winning holistic farmer from Uganda and a US public health nutrition scientist made an important contribution to a more balanced and informed discussion of the very different roles of livestock around the world today.**

They pointed out the huge contrast between industrial farming systems widely used in the west with the way that cattle, goats, camels, pigs and chickens are integrated into smallholders' sustainable and nature positive crop-livestock systems in Africa. They also highlighted the marked discrepancy in consumption of meat, milk and eggs by wealthy Europeans and poor Africans.

The authors, Emma Naluyima Mugerwa and Lora Iannotti, also drew attention to the impact of the coronavirus pandemic on the prevalence of poverty and malnutrition, especially amongst smallholder farmers in Africa, Asia and Latin America. According to World Bank and UN data that they cite, in 2020 an additional 97 million people in these regions were pushed into extreme poverty while the number of malnourished people rose by 161 million.

The pair were especially concerned that despite livestock farming being essential to the health and wellbeing of half a billion poor families in developing regions, their voices may not be adequately heard at two important up-coming global events: the UN Food Systems Summit taking place during the UN General Assembly in New York on September 23 and the UN climate summit (Cop26) being held in Scotland in November. They feared they would be drowned out by the vocal opponents of industrial livestock farming. Yet, greater access to even small amounts of animal-source foods could have prevented the stunting suffered by 149 million children under 5 in 2020, the impacts of which would be felt throughout their lives and even into the next generation.

Their op-ed states: "… for a significant portion of the world's malnourished people, milk, meat and eggs are a source of essential nutrients not available – not now, nor in the foreseeable future – in plant-based alternatives… among young children, modest portions of nutrient-dense animal products are uniquely effective in preventing or addressing chronic malnutrition. The high concentration of essential nutrients in animal-based foods – often impossible to replicate in plant-based foods – also makes them highly valuable during other life stages, especially adolescence, pregnancy and lactation".

They suggested that focusing solely on the risks associated with livestock, and distractions such as the 'moonshot for meatless meat [15] ' recently advocated for in an op-ed in the New York Times, meant the world's most vulnerable communities will be even poorer and hungrier in the future. Instead, they called for investments and targeted government policies to encourage creative and innovative solutions for sustainable livestock farming that are good for people and the planet.

Meanwhile, ILRI's newsletter editor, Susan Macmillan[18], recently looked back over the past three decades when her job was "to promote livestock science and scientists working to alleviate poverty, hunger and environmental degradation — at levels that are killing people, livelihoods and ambitions in poor countries."

Noting that previously this had seemed a clear enough purpose for her professional life, she admitted that "the debates now [agitating] livestock issues on every side have eroded [her] assuredness" and she now vowed "to embrace ambiguity as well as diversity in livestock communications".

*(14) https://www.theguardian.com/global-development/2021/sep/10/criticism-of-animal-farming-in-the-west-risks-health-of-worlds-poorest*
*(15) https://www.nytimes.com/2021/04/24/opinion/climate-change-meatless-meat.html*

ILRI'S JIMMY SMITH ON BRINGING SCIENCE-BASED NUANCE AND CLARITY TO TODAY'S POLARIZED LIVESTOCK DEBATES

**JIMMY SMITH**

FORMER DIRECTOR GENERAL OF ILRI

## ILRI'S FORMER DIRECTOR GENERAL CALLS FOR PARADIGM SHIFTS IN AGRICULTURE IN DEVELOPING COUNTRIES

ILRI's former director general, Jimmy Smith, used his recent keynote presentation [16] at the annual interdisciplinary conference on research in tropical and subtropical agriculture, natural resource management and rural development, TROPENTAG [17], to call for three paradigm shifts in agriculture in developing countries to ensure a healthy and sustainable future. These were to:

**1.** Incentivize agricultural growth with equity: Food agriculture must become a 'growth pole' generating equitable and broad benefits, for women (who make up nearly half of all farmers) and for youth (who make up 60% and 38% of the populations in Africa and Asia) as well as for men and adults.

**2.** Focus on small-to-medium-scale farmers and entrepreneurs: Research and innovation must respond to today's vast agricultural populations, which comprise mostly small-to-medium-scale farmers, herders and entrepreneurs.

**3.** Strengthen local and regional agricultural supply chains: Agricultural supply chains must be professionalized, shortened and reflect a focus on local and regional markets rather than export markets.

Dr Smith suggested these major changes were needed to enable agriculture in developing countries to meet rising demands, nourish as well as feed people, and be produced, sold and consumed sustainably as well as profitably, equitably and safely.





**Emma's one-acre farm in Uganda provides a model for how this can be done: the livestock, crops and trees she grows complement each other and provide her family with nutritious food, fuel and an income from selling the surplus to the local community.**


Emma Naluyima Mugerwa

CREATOR OF THE ONE-ACRE FARM, UGANDA

Amongst a long list of the concerns Susan now admits she has always harboured are: "… extreme materialism as well as extreme poverty… empty as well as too few calories…cruelty to food-producing animals on small as well as large farms—and in poor as well as rich countries…people over- as well as under-eating…unsafe foods sold in supermarkets as well as in the ubiquitous informal 'wet' markets of developing countries… the next pandemic emerging from our forests and farms and animals…too little manure to nourish crop soils as well as too much manure creating dead zones…real as well as alternate realities…people with too much as well as too little agency…misuse of antimicrobial drugs in livestock systems in low- as well as middle-to-high-income countries…the environmental impacts of alternative as well as real meats… empowerment of boys as well as girls…lost connections among animals, people and lands in traditional as well as modern societies…the management of artificial as well as natural resources…"

Susan concludes by writing: ***"I know that there is much about livestock production systems to address/redress//improve/prevent in every country of the world, including the corner where I live, in East Africa. And in my heart, I know that there can be no free pass given to countries that are highly politicized, or that are poor, or mismanaged, or distracted by conflict. We simply have no time, no wiggle room left, for free passes in a globalized world where actions (or lack of actions) in any one nation can so readily affect us all. We all have to work on this. And of course those with greater resources will have to support with those with much fewer. There is simply no other way to keep us all safe and for everyone to benefit."***

The views expressed by Emma Naluyima Mugerwa and Lora Iannotti fit perfectly with Ceva's purpose statement which includes a commitment to 'support all sustainable forms of agriculture - large and small to help produce enough safe and affordable food.' However, Jimmy Smith's calls to arms and Susan Macmillan's "case for not making a case for, or against, livestock" clearly demonstrate just how challenging it will be to adapt the world's food production systems to enable a healthy and sustainable future for all.

*(16) https://www.slideshare.net/ILRI/smith-tropentag*
*(17) TROPENTAG is jointly organised by the universities of Berlin, Bonn, Göttingen, Hohenheim, Kassel-Witzenhausen, ZALF e.V. (all Germany), Ghent University (Belgium), Czech University of Life Sciences Prague (Czech Republic), BOKU Vienna (Austria), and the Council for Tropical and Subtropical Research (ATSAF e.V) in co-operation with the GIZ Fund International Agricultural Research (FIA).*
*(18) https://tinyletter.com/SusanMacMillan/letters/taking-stock-the-case-for-not-making-a-case-for-or-against-livestock*

# TRAINING VETS TO SUPPORT EMERGING COMMERCIAL POULTRY FARMERS IN BANGLADESH AND ETHIOPIA

**In 2015, Ceva received a grant from the Bill & Melinda Gates Foundation to manage a 5-year long project to provide specialist training on poultry health management to a total of 180 vets in Bangladesh and Ethiopia. The objective was to increase the vets' individual and collective capacity so they could better support emerging commercial poultry farmers. The global coronavirus pandemic disrupted plans but, despite this, by April 2021, a total of 152 vets from the two countries had successfully completed the training course, 12 of whom had completed a year-long mentoring program to equip them to become local leaders for future courses.**

Global demand for poultry meat and eggs has increased dramatically over recent years and demand is projected to continue to increase in the coming decades. In response, the global poultry flock has increased six-fold since the early 1960s.

The majority of poultry meat production in many developing countries, including Bangladesh and Ethiopia, is still done by traditional farmers practicing uncontrolled mating and natural incubation, and selling most of their meagre production live through small markets or for home consumption.

To intensify production sustainably and meet the growing demand, efforts need to focus on small to medium-sized commercial farms, and in particular on emerging ones. These represent the bulk of the commercial production and have significant potential for improvement but currently have limited access to quality services and technical support.

Emerging commercial farmers need access to well-trained poultry advisers who are able to support them in adopting a preventive health approach and implementing good flock management practices, including appropriate vaccination and biosecurity, as well as effective curative treatments when necessary. However, the rapid growth of the poultry industry in developing countries in recent decades has not been accompanied by a similar development of skills among animal health professionals. They often had to learn on the job and their curricula are almost exclusively based on disease recognition and treatment, while avian production mostly requires a preventive vision.

Naturally, the few specialized poultry health professionals are in demand from the main large-scale commercial poultry producers, so there is a great need to create and develop similar services for the fast-growing emerging commercial sector. The current initiative set out to address that need.

The five-year project started in Bangladesh in 2016 and Ethiopia in 2018. The plan was to train 30 vets a year over three years in each country.

The training program consisted of delivering four modules to vets and technicians, each of which lasted a week. The modules were run at monthly intervals over a four-month period. They focused on the critical skills that an animal health professional needs to acquire to support commercial farmers in shifting towards more preventive practices in order to sustainably intensify their production.

Ahead of each module, participants received a reading list, which aimed at refreshing their knowledge and previous learning so they had the basics required for the training program. At the beginning of each module, they were given a test to ensure those prerequisites were well understood. This meant that the week-long training sessions could focus on both theoretical sessions, aiming at upgrading participants' knowledge, and more importantly on practical sessions (post-mortem examinations, group work, farm visits) to capitalize and apply this knowledge in very practical cases. The overall focus of the program was on preventive approaches.

To ensure participants had understood and retained the material taught, they were tested at the end of each module. Those who achieved a score of 50% or above in all four weekly tests received a certificate signed by a representative of the local and French veterinary schools, which were Ceva's partners on this project.

Simultaneously, a mentoring program, aiming at training the future lecturers, was also implemented. It consisted in selecting the best participants from the first session (called mentees) and to assign a mentor to them, according to the specific topics they want to specialize in. After following a full year-program developed by their mentor, mentees were expected to be able to provide quality training to future participants without external supervision.

The program was delivered through a partnership between the public and private sectors and local and international partners who played complementary roles, including a French academic partner which developed the curriculum. For Bangladesh this was National Veterinary School of Alfort (ENVA) and for Ethiopia this was the National Veterinary School of Toulouse (ENVT). A local veterinary school coordinated the operational implementation of the training program at the local level and validated the curriculum. In Bangladesh this was the Faculty of Animal Science and Veterinary Medicine (FASVM), Sher-e-Bangla University and in Ethiopia this was the College of Veterinary Medicine and Agriculture (CVMA) of Addis Ababa University. The course was run from the two local vet colleges.

Local private sector partners who worked in the poultry sector provided support in implementing activities. Jointly with the local university partner they also helped to contextualize the course content to the local situation and were responsible for the selection of the participants for training, since they were already in contact with many of them through their commercial activities in the sector.

The vast majority of the veterinary profession in developing countries are men. The local partners who were responsible for recruiting the applicants for the courses were sensitized to the need to encourage women vets to apply. However, in Bangladesh over the three courses, just under 16% of participants were women; in Ethiopia for the two courses that have been completed, just over 18% were women. All participants were aged 35 years or under.

There was a low drop-out rate, less than 3%. All participants surpassed the minimum pass rate for the test, 50%, and were awarded certificates acknowledging their achievements. Any participants who were found to be struggling after the second of the four modules were given additional coaching by the experts. They were also required to submit additional case studies and post-mortem and farm audit reports to strengthen their learning and to earn extra credits towards the test score.

Up until April 2021, 152 animal health professionals successfully completed the training program and 12 mentees have joined the mentoring program.


## THE PROJECT'S DELIVERY TEAM IDENTIFIED FIVE KEY FACTORS WHICH THEY BELIEVE CONTRIBUTED TO THE SUCCESS OF THE INITIATIVE.

## THESE WERE:

### 1. Use a transformative public-private partnership approach to deliver the training

Ceva had previous experience of working successfully in partnerships involving public and private sector partners and so decided this approach was best suited to this program. Moreover, involving the public sector, whose tasks include the supervision of animal health professionals' education, was also necessary to ensure the sustainability of the training program.

Bringing together public and private sector players, as well as local and international ones, enabled synergies to be exploited that made the best use of the respective skills and expertise of all the partners. Together the resultant partnership could achieve much more than the individual partners could have achieved alone.

### 2. Select the right participants

The main objective of this program was to train competent candidates capable of supporting commercial farmers in developing their businesses. To be selected for this program, participants should therefore prove that they significantly impact those commercial farmers in their everyday activities, either directly (practitioners) or indirectly (decision-makers). This criterion can be considered as the main key success factors of this training initiative.

They also had to show personal commitment to participate actively in the intensive training program. Despite their full-time jobs, they had to attend all sessions, which represented 4 weeks of their time over a 3-month period, plus preparatory readings for each module and very participative activities.

*At left, Pierre Marie-Borne, Public Affairs Director - Public Health Zoonoses and Food Safety at Ceva, and veterinary students in Ethiopia.*

*The project's delivery team identified five key factors which they believe contributed to the success of the initiative.*

### 3. Focus the training on the skills necessary to support the paradigm shift

To this end, each module was developed and delivered by a team of seven international experts who had complementary expertise and specialist knowledge on poultry medicine and production management.

Recognizing that for the vets to do their jobs they need a combination of theoretical knowledge and practical skills, the modules combined both elements, although more than half the time was allocated to practical sessions such as clinical case studies, post-mortem examinations, and farm visits and audits.

Each session involved a maximum of 30 participants; numbers were limited to ensure a high-quality learning experience for all, especially during practical sessions.

### 4. Create a cohesive and dynamic group of autonomous animal health professionals

During the five-year long project, the objective was to create an impactful pool of diverse professionals able to support the development of the poultry sector in each country towards a more sustainable management model based on prevention. To this end, participants had first to develop their self-confidence and autonomy, as they will have to make their own decisions in the field, based on their observations. The program was therefore very participative, encouraging vets and technicians to regularly contribute, especially during the frequent group work, and by presenting case studies that they had to prepare between each module. They also had to work on their personal business case, which describes the way they intend to use their new knowledge and skills after the training.

In addition to increase their individual capacities to support commercial poultry farmers, the training modules were also designed to include activities and features that facilitated team building. For instance, preparing their personal business case also encouraged participants to consider and share with the group their plans on how they are going to put their training into practice in their everyday activities. It allowed participants to better know each other and to understand each one's experience and choices. Besides, many activities, such as clinical cases and farms audits, were conducted in small groups. All groups had to designate their leader, taking it in turn to play this role, to frame their discussions and present their conclusions to the other groups. It encouraged health professionals to work together and reach consensus, as well as remaining open to the constructive comments of other participants. It was also a way to develop their communication skills.

To facilitate this esprit de corps, vets and technicians who participated in previous training sessions were also encouraged to attend the award ceremonies held at the end of the later course so the different batches of health professionals could meet each other.

In addition, the participants were encouraged to structure their group to make it sustainable. As a result, in each country they formed Facebook discussion groups to enable them to discuss challenging cases, share and receive advice, and discuss any 'hot topics' that emerged. Some of them also chose to create their own association or to join an existing one.

In these ways, it was anticipated that a community of practice would emerge that would continue after the project finished and that would enable the trainees to support and encourage each other in the future.

### 5. Include an exit strategy from the outset

The nurturing of a community of practice amongst the animal health professionals who participated in the training sessions was one element of the exit strategy.

A part of this strategy was achieved by reinforcing the competencies of the public sector, as they are in charge of training the future animal health professionals in their country. To this end, some of the lecturers from the local veterinary schools were selected to participate in the training program, to refresh their knowledge and discover new educational approaches they could use in their own programs.

A complementary part of this strategy was also to select and train some participants so they could continue training other vets and technicians after the end of the project. To achieve this, the best performing participants from the first training sessions were selected to take part in a mentoring program.

Beyond ensuring the technical continuity of this training, an important part of the exit strategy consisted in transferring the organizational competencies necessary to implement such program. Following the same pattern as the mentoring scheme, someone in each country was supported in supervising all the operational activities, such as: the selection of participants, the logistics and the budget analysis. By the end of the program, this person was expected to have developed sufficient competencies to be able to adapt the training model according to the local needs, budget and targets.

All of these features of the training initiative were designed to ensure a legacy that would build on the foundation laid down by the project and live on after the end of the training program.

**Commenting on the training program, Pierre-Marie Borne, Public Affairs Director - Public Health Zoonoses and Food Safety at Ceva, said:**

*"Despite the challenges posed by the global coronavirus pandemic, we have succeeded in establishing a community of practice of specialist poultry veterinarians in Ethiopia having already done so in Bangladesh. These vets are especially well placed to support emerging commercial poultry farmers to adopt effective preventive approaches as well as to support each other and to help train future generations of poultry vets – all of which will boost domestic poultry production and ensure this is done safely and sustainably."*






# CEVA SPONSORS WORK TO SAVE THE PANGOLIN - THE WORLD'S MOST TRAFFICKED MAMMAL

**The eight species of pangolin found in Africa and Asia are unique mammals; their bodies are covered in scales not hair and they eat only ants and termites. They are shy, mainly solitary and nocturnal, and include species that live on the ground and that can climb in trees. Although widespread in Africa and Asia, they are rarely seen.**

When threatened they coil up in a ball, protected by their hard scales. Although this defence mechanism is effective against many of the predators that pangolins have existed alongside for millions of years, it is much less so against more modern hazards.

Today, pangolins face a number of threats to their survival, including loss of habitat and being killed on roads and by electric fences. But the greatest threat is due to the illegal domestic and international trade for bushmeat and also traditional medicine based on pangolin scales.

Demand for pangolin from China and Vietnam, where the meat is highly prized and the scales are used to treat a variety of ailments, is huge and continues to grow. In the past, the international trade has largely involved Asian species but, due to their precipitous decline, traders have increasingly turned to the Africa species to meet the insatiable demand from Asia. It is estimated that more than 2.7 million pangolins are taken from the wild each year.

As a result, the African species are all classified as vulnerable while the Asian species are either endangered or critically endangered.

Fortunately a number of organisations have stepped up to help save the pangolin, the world's most trafficked mammal. Foremost amongst these is the African Pangolin Working Group, which Ceva started to sponsor in 2021 as part of its renewed commitment, spelt out in its business purpose, to protect animals at risk of extinction.

Established in 2011, the African Pangolin Working Group spans the fields of intelligence operations and confiscations of pangolins from the illegal trade. It is mandated by the South African government to oversee the care and rehabilitation of pangolins and their release back into the wild. It also does training for law enforcement, prosecutors, vets and rehabilitation specialists in South Africa and beyond, works closely with the South African Police Force and the Environmental Inspectorate, and its publication of pangolin-related research is extensive.

To increase awareness of the plight of the pangolin and to mark World Pangolin Day, on February 19th 2022, Ceva shared messages via their social media channels about this unique group of species and the threats they face. The messages featured a short animated film, commissioned by Ceva, that features a very appealing pangolin.

**Since 2018, Ceva has also worked with the International Fund for Animal Welfare (IFAW) to help tackle the illegal trade in elephant ivory and pangolin scales in West Africa. Ceva's support helps to ensure that the 'Cotonou canine brigade', an elite group of highly trained detection dogs based in Benin, remain healthy so they can effectively work with their handlers to sniff out ivory and pangolin scales at key smuggling points, such as air and sea ports.**

**See : https: *//www.togetherbeyondanimalhealth.com/ceva-helps-ensure-elite-detection-dogs-remain-healthy-as-they-protect-endangered-wildlife-in-west-africa/***

# CEVA SUPPORT HELPS CONSERVE BIODIVERSITY IN NOUVELLE-AQUITAINE REGION FRANCE

**Ceva's ongoing support to Conservatoire des Races d'Aquitaine – a not-for-profit organisation created in 1991 to deal with the disappearance of the biological and cultural diversity associated with the Novelle-Aquitaine region's unique livestock and other domestic animals – is helping the organisation to achieve important biodiversity wins.**

In 2018, Conservatoire des Races d'Aquitaine launched an initiative to reintroduce sheep to vineyards to practice 'eco-pastoralism' – a new name for a lost, traditional management system in Bordeaux. Initially just three chateaus accepted the organisation's offer to use a small flock of Landaise sheep to graze their vineyards during the winter and early spring. By 2021, 14 chateaus had signed up and eleven of them agreed to take over year-round management of their flocks.

Returning sheep to the vineyards brings a number of environmental benefits: the sheep enrich the soil through their manure and undertake natural weeding as they graze; the soil is much less compacted compared to when heavy machines are used, thereby enhancing soil structure and health, and reliance on fossil fuels is reduced; and there is a noticeable increase in abundance and diversity of native flora, insects and other wildlife.

Previously, the Conservatoire des Races d'Aquitaine, working in partnership with Parc Naturel Régional des Landes de Gascogne, has worked to reverse the severe decline in the population of Landaise sheep. At the end of the 19th century there were more than a million of this hardy breed, which was valued locally for its manure, used to fertilize crops, as well as its meat and wool. However, over time the breed was replaced locally by more productive improved breeds and by 1965 just a few hundred survived. In 1975, alarmed at the risk of losing the breed for ever, the partners secured the last three surviving bloodlines of the breed and began to promote the advantages of using Landaise sheep, especially in relationship to eco-pastoralism. Their initiative succeeded and today there are more than 3,000 of these hardy sheep in the region.

Commenting on the benefits of bringing Landaise sheep back to his vineyard since 2019, Alain Ferran, owner of the Château Ferran, a biodynamic estate, explained: "From the start, the presence of the ewes changed the atmosphere in the vineyards. The vines came to life, the grazing by the sheep allowed a change in the flora, the earthworms have multiplied, soil life is activated all the time…It is very relaxing to be among the herds of sheep. Even if we did not quantify the advantages, morally it is super beneficial as a winegrower to be in contact with animals. I am proud to participate in the development of this breed that I love so much".


**Conserving France's native black bee**

Both wild and domestic bees are essential components of healthy and balanced ecosystems as these species help to pollinate more than 80% of flowering plant species.

The black bee *(Apis mellifera mellifera)* is the honeybee sub-species that was originally found in Western and Northern Europe, including the Novelle-Aquitaine region. During the past 50 years, however, beekeepers have often imported different honeybee subspecies from throughout Europe and other types of wild honeybee, including subspecies from Africa, have expanded their ranges to Europe.

Alarmed at the implications of these developments for the indigenous black bee of Novelle-Aquitaine, in 2019 a survey was undertaken, led by the Conservatoire des Races d'Aquitaine, to establish the genetic composition of honeybees in the region. The results confirmed the widespread presence of populations whose genetic make-up included components from honeybee subspecies from other parts of Europe and Africa. Most colonies showed high levels of hybridization with these exotic lineages but 33 of the 120 colonies sampled showed only weak levels of hybridization – that is, these colonies were closer to being pure native black bees.

Bees collected from these relatively pure colonies were taken to a specially created conservation apiary located in a natural forest within a military zone in Biscarrosse in Novelle-Aquitaine. Being a military zone, it was much easier to avoid possible introduction of non-native bee populations.

Another survey was conducted in 2020 to improve understanding of the genetics of honeybee populations in the region and to enable different stains of black bee to be identified. This will enable the genetic diversity of the black bee population at the conservation apiary to be increased. Eventually, it is hope that swarms and queens of the native black bee can be made available to the region's beekeepers. Meanwhile, in 2021, the first educational apiaries containing black bees were established with municipal partners in the region.

**ALBATROS**
AMSTERDAM ISLAND


# CEVA CONTINUES TO SUPPORT CONSERVATION OF ENDANGERED SEABIRDS IN SOUTHERN OCEANS

**Since 2013, Ceva-Biovac has partnered with France's largest research ecology organisation, the Centre d'Ecologie Fonctionnelle et Evolutive (CEFE), to undertake research aimed at conserving populations of endangered and threatened albatros species in the Southern Oceans. Building on the successes achieved to date, Ceva-Biovac has just agreed to continue supporting this vital work to help conserve albatross and other at-risk seabirds in the region, including the southern rockhopper penguin.**

The work undertaken by Ceva-Biovac and CEFE to date has focused on albatross species threatened by the infectious disease avian cholera on Amsterdam Island, a remote island in the southern Indian Ocean. The yellow-billed albatross, which is locally abundant, suffers very high mortalities of chicks most years, most likely due to infection with Pasteurella multocida, the bacterium responsible for causing avian cholera. The island is also home to the world's rarest albatross species, the Amsterdam albatross, the entire global population of which breeds on its high plateau. So far, the Amsterdam albatross has not suffered from the high mortality observed in the yellow-billed albatross but with a total population of less than 300 birds the species is at risk of extinction if avian cholera spreads to this species too.

Using bacteria isolated from dead albatross found on the island, the team from Ceva-Biovac have previously developed two formulations of a bespoke vaccine (also known as an auto-vaccine) and also a serological test to measure the quantity of specific antibodies to Pasteurella multocida in the blood of seabirds. Pioneering vaccination trials undertaken in wild populations of yellow-billed albatross chicks and also in adults have shown promising results: vaccinated chicks have experienced lower mortality rates than unvaccinated chicks and maternal antibody has been shown to be transferred from vaccinated females to their chicks two years after the adults were vaccinated. As albatross are very long lived, vaccination of adults could be an effective way of protecting chicks without the need to handle chicks each year.

However, mortality rates of yellow-billed albatross chicks are still high. This is thought to be due to the chicks being attacked by rats, which were accidentally introduced to the island by man along with mice and cats. The rats attack the chicks at the nest. Research has demonstrated that the rats carry Pasteurella multocida in their mouths and likely infect the chicks, which may prevent the vaccine from protecting the chicks. To address this threat to albatross and other seabirds, a campaign is being implemented to eradicate rats, mice and cats from Amsterdam Island.

While the eradication campaign is being implemented, further research on avian cholera will be undertaken by CEFE and Ceva-Biovac. This will include monitoring of individual yellow-billed albatross to refine the proof-of-concept for vaccination in a population of wild seabirds. The work will also cover monitoring of various species of seabirds in the region for antibodies against Pasteurella multocida, including the southern rockhopper penguin, a species in which mortality events have been observed. It is envisaged that the presence of antibody against Pasteurella multocida in predatory and scavenging species of seabird, such as skuas, could be used as a sentinel for the circulation of the pathogenic agent in the wider French Southern and Antarctic Territories. Eventually, the findings from the research program combined with a successful rat eradication campaign may enable the authorities to recommend using vaccination as a tool to protect endangered species including the Amsterdam albatross.

Commenting on this work, Alain Schrumpf, General Manager of Ceva Biovac said: ***"We have demonstrated proof-of-concept for the use of autogenous vaccines to protect endangered wild seabirds by preventing high mortality in chicks. Albatrosses are long-lived birds and, because they are unafraid of people, they can be easily captured at the nest. It is therefore feasible that we could vaccinate breeding females and rely on transfer of maternal antibody to protect the chicks. This is an area where Ceva have a lot of experience from developing and using vaccines in poultry, although further research is still needed to address technical and practical issues before use of autogenous vaccines could be used at scale to protect populations of at-risk seabirds."***

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