NEW TECHNOLOGIES, VACCINES AND INNOVATION

Issue
Technology has radically changed and enhanced our day to day lives: internet, high speed trains, email, nanotechnology, etc. A similar revolution continues to take place in the medical sector, both human and animal. This is mainly due to the constant emergence of new diseases, or re-emergence of diseases which can mutate and change, or diseases which are currently impossible to vaccinate against. With climate change we are seeing more and more diseases move due to ticks, mosquitoes and flies appearing in countries where they previously were not seen. Disease essentially knows no borders and it is only through new developments in technology and science that we can remain at the ready to control them.

New diseases are constantly emerging and the animal health sector sees this challenge and the important role it plays. If we look at Bluetongue for example, each of the 25 different serotypes of the disease requires a different vaccine. Over the last 15 years, there have been six different Bluetongue serotypes in Europe alone. Avian influenza viruses, to take another example, are estimated to have led to the culling of 200 million birds in Asia alone, with losses of more than 10 billion US dollars for the region’s poultry sector.

Diseases are constantly mutating and new diseases are emerging. Cutting-edge research and biotechnology are vital to combat these.

Our contribution
Investing in R&D and ensuring innovation remains at the core of our business is vital. The first use of biotechnology in the medical world is recognised as the first production of human insulin in 1978. Advances in science and technology have come to the fore in the development of new or improved vaccines to prevent and control diseases such as Avian Influenza, Foot and Mouth Disease, Rabies, and Classical Swine Fever.

One of the earliest developments in animal health was the Aujeszky’s disease vaccine. It allowed a successful eradication programme in several European countries. Similarly, Rabies is a success story which affects people and animals. There is a Rabies vaccine which has been highly successful in large parts of Europe. If we look on a global level and see that each year 55,000 people die of Rabies, mostly children, and know this is preventable, you can see how a Rabies vaccine can change lives and societies and know the value of vaccines and new technologies.

The animal health sector holds to the premise that preventing is better than curing, and with this premise vaccination is vital. Vaccines are an essential part of the veterinarian’s toolbox. Through vaccination the vet can improve the natural immunity of the animal by stimulating the response before the disease strikes. It allows farmers to protect entire flocks or herds and it keeps our pets safe and healthy from deadly diseases. In addition it ensures our food safety in that it protects animals from harmful foodborne pathogens, such as Salmonella.

Advances in animal health have or could also benefit human health; the development of a vaccine for dogs against cancerous Melanoma is something that could be looked at from a human health angle.

“There are 25 different serotypes of Bluetongue. Each strain requires a different vaccine.”
Seventeen year old Ana helps her grandfather with the running of a small business breeding Dalmatian dogs on their farm in the Dalmatia region of Croatia, from which the animal derives its name. It is Ana’s responsibility to ensure that the dogs and their puppy litters are well cared for and healthy before they are put up for sale. “Prevention is always better than cure,” her grandfather Ivan repeats to her over and over again.

One method of disease prevention is vaccination. Vaccines are a safe and easy way to stimulate a body’s natural defence process to prevent disease and protect animal and human health and welfare.

Ana’s grandfather lived through one of the last massive Smallpox epidemics that occurred in the former Yugoslavia in the 1970s. Less than two decades later, following large scale international vaccination campaigns, the World Health Organisation declared Smallpox to be eradicated – the first disease ever to achieve this status.

The term “vaccine” derives from Edward Jenner’s use of Cowpox (Latin from “vaccia”, meaning “cow”) to inoculate humans to protect against smallpox in 1796. Cowpox was a less serious zoonotic disease related to Smallpox that milkmaids often caught through exposure to infected cows. Jenner noticed that milkmaids who had contracted Cowpox were later immune to Smallpox, and tested out his theory through the world’s first vaccine. Since Jenner’s first discovery, a close proximity between the development of human and veterinary vaccines has existed.

Like humans, when animals get sick, their immune system identifies the harmful virus or bacteria (also known as a pathogen) causing the disease, and creates antibodies to kill the pathogens. Vaccines improve natural immunity by tricking the body into believing it already has a disease without actually making the body sick. A similar principle applies when using antisera to help during infection too. The immune system remembers the pathogen and can then defend the body against any natural exposure to that pathogen in the future.

The basic principle of vaccination is that a small amount of a weakened (live attenuated) or inactivated (killed) organism is introduced into the body. This stimulates the body’s immune system to fight back. The immune system then remembers this organism and as a result can defend the body against any exposure to related organisms in the future. A ‘live’ or ‘attenuated’ vaccine means that the organisms used to make the vaccine have been made harmless. Other vaccines are made of ‘killed’ or ‘inactivated’ organisms – in either case, it means that the organism can elicit an immune response, but cannot cause disease. Vaccines are usually specific for a particular pathogen and disease and only in rare circumstances can a vaccine be produced from other related pathogens, such as in the case of Smallpox that was originally treated by a vaccine related to Cowpox.

Ana’s grandfather is well aware of the importance of vaccinating the cattle on his farm. He works closely with the local veterinarian to make sure that all of his livestock is vaccinated and healthy so that he can protect his family and customers from exposure to zoonotic diseases that can be passed through contact with diseased animals and contaminated food products. His healthy livestock means that his farm remains economically viable and reliable for livestock rearing.

Likewise, Ana must ensure that the breeding Dalmatians are routinely vaccinated so that the puppies can receive antibodies from their mother through their blood system during birth and through their first milk when they are born. It is necessary to boost and supplement these antibodies as the puppies get a little older, to protect against core canine diseases including Rabies, Parvovirus, Distemper, Infectious Canine Hepatitis and Leptospirosis.

The local veterinarian is on call to administer the required vaccinations through injection, orally, nasally or via a scratch on the skin depending on the type of vaccine used. To ensure maximum protection, the veterinarian takes care to vaccinate the whole litter simultaneously. Ana must keep track of the dates of vaccinations and share this information when they sell the puppies because some vaccines require a booster shot annually or every few years to ensure that the level of antibody immunity remains high. Older pets need protecting too, as their immunity can decline.

As Ana and her grandfather know first-hand, vaccines are an essential tool in the veterinarian’s toolbox that have profoundly influenced and improved world health. Until Louis Pasteur and Emile Roux developed the first Rabies vaccination in 1885, every Rabies infection resulted in death. Today, vaccines can prevent Rabies in both humans and animals, and vaccination programmes have eliminated this disease in many parts of the world. Vaccination was an essential tool in eradication campaigns against Rinderpest (cattle plague), the second disease ever to be eradicated from the globe as officially declared by the UN’s Food and Agriculture Organisation (FAO) and the World Organisation for Animal Health (OIE) in 2011.

While at present vaccines are not available for all infections and new diseases are constantly emerging, modern research into vaccines holds great promise and opportunity for the future.