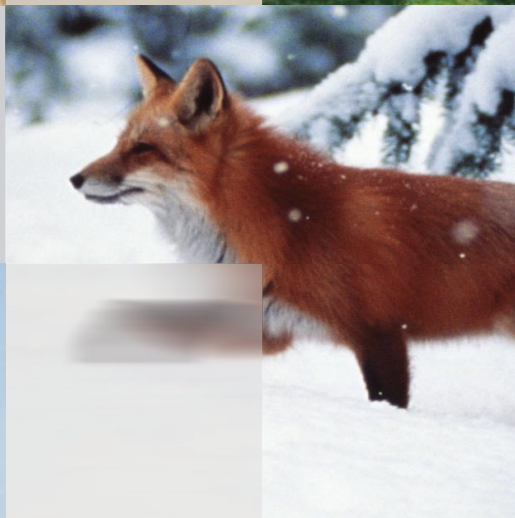


02

# VACCINES

## Protecting our animals

Some important facts about how and why vaccines are developed





**Veterinary medicinal products make a significant contribution to improving the world we live in. Animals, like people, suffer from disease and require proper care from veterinarians, farmers and pet owners. Whenever possible, prevention is always better than cure. One method of disease prevention is the use of vaccines.**

**The mission of the animal health industry is to supply safe, efficient and cost effective veterinary medicinal products, including vaccines. Vaccines are a safe and easy way to stimulate the body's natural defence process to prevent disease and contribute to animal health and welfare.**

**The manufacture and sale of medicines, including vaccines and antisera, is highly regulated to ensure that only safe and effective products of consistent quality reach the marketplace.**

**This leaflet summarises important aspects about vaccines and antisera to increase understanding of a fascinating subject.**

## **The importance of animal medicines and vaccines**

The main aims of animal medicines and vaccines are:

- To prevent animal disease and treat it when it occurs;
  - To ensure animal welfare and healthy food;
  - To preserve a healthy environment;
  - To foster economical livestock rearing, for food and recreation;
  - To protect public health and control animal diseases which threaten people through contact with animals or food contamination.
- **Vaccines play an important role in meeting these aims:** Vaccines and antisera<sup>1</sup> are most commonly used to prevent diseases caused by pathogens such as bacteria and viruses. They can also be used to control diseases caused by other organisms, such as parasitic worms and fungi (e.g. ringworm).
  - **Maintaining animal health is vital:** Vaccines contribute to the welfare of both food-producing and companion animals, the prosperity of farming, the safety and availability of food, and the health of animal owners. They play an important role in the fight against illness and have achieved great success in controlling many diseases of vital importance in farm and companion animals or those which threaten human health (e.g. smallpox, rabies and salmonella).
  - **Healthy animals lead to a safer environment:** Healthy animals make a positive contribution to the environment by reducing the chance of zoonotic disease<sup>2</sup> (e.g. salmonella poisoning), the spread of diseases from the increase in movement of goods, animals and people, as well as making better use of resources in feeding an increasing world population.
  - **Vaccines enhance consumer safety:** Food coming from vaccinated animals is potentially healthier, as it means that the animal has not suffered from that disease. Particularly for zoonotic disease organisms, e.g. salmonella poisoning, vaccination can reduce the health risk for the consumer.
  - **Vaccines contribute to world health:** Vaccination has profoundly influenced and improved world health, and will continue to be a fundamental tool to meet future health challenges. It has eliminated smallpox and can control many other health scourges against which no other treatment exists, such as human polio, foot-and-mouth disease in cattle, canine distemper and rabies in man and animals.
  - **New diseases are constantly emerging:** Therein lies the challenge of bringing the benefits of vaccines to remote less developed areas of the world, where rural societies are often dependent upon their animals. Research into modern technologies provides an opportunity to meet these challenges.

<sup>1</sup> Liquid extracted from the blood containing antibodies against specific antigens.

<sup>2</sup> Diseases that animals can pass on to people.

## Prevention is better than cure

- It is always preferable to prevent disease rather than having to resort to treatment. The consequences of disease may be, for example, transmission to other animals or people, loss of efficiency through reduced animal growth, drop in milk production and death.
- Good husbandry, including efficient bio-security measures, is the most important factor in prevention of diseases in livestock. Nevertheless, animals can become ill and highly infectious diseases can spread rapidly with devastating results. Vaccines are an important part of the veterinarian's toolbox.
- By using vaccines, the veterinarian can improve natural immunity by stimulating the response before disease strikes or, with antisera, in the very early stages of infection. In addition, with vaccines, whole flock or herd protection can be achieved, as well as protection of people.



## Principle and advantages of vaccination

The basic principle of vaccination is a biological bluff. If a small amount of a weakened (live attenuated) or inactivated (killed) pathogen is introduced into the body, it stimulates the body's immune system to fight back. The immune system then remembers the pathogen and can defend the body against any natural exposure to that pathogen in the future. That memory allows the body to respond rapidly and strongly to a re-infection with the same pathogen.

### Advantages:

- **Animals do not have to get sick to become protected.** The vaccine (containing antigen<sup>3</sup>) when administered stimulates the animal to produce its own protective antibodies, as if it had been exposed to a natural infection, but without the danger of contracting a serious clinical disease. The immunity is therefore active, but in this case, it is artificially induced and the animals do not have to get sick in order to be resistant to future exposure to the disease.
- **Tailor made protection:** During vaccine or antiserum manufacture, the strains of micro-organisms are chosen to meet the expected patterns of disease over a wider field and can be varied as these patterns change over time. This keeps people and animals, such as pigs and horses, properly immunised.
- **One injection – multiple protection:** One single vaccine injection can incorporate more than one disease or disease strain to provide combined protection against several strains of micro-organisms or several diseases.

## Vaccine production

- Conventional vaccines are derived from the pathogen causing the disease and hence are specific for that disease. Only in very limited cases can a vaccine be produced from a closely related disease organism: for example, a vaccine made from cowpox virus will give you protection against smallpox virus.
- Sometimes only part of the micro-organism or a secretion from it is used. In some cases, toxins responsible for the disease are separated and treated to render them harmless, while retaining their immunising properties. They are purified and formulated to form the final vaccines or "toxoids". Tetanus and diphtheria vaccines are prepared in this way.
- Both live and killed vaccines exist. Vaccines can be produced using live micro-organisms that have been "attenuated" in some way to make them harmless. These are known as "live" or "attenuated" vaccines. Alternatively, vaccines can be produced using killed (inactivated) micro-organisms. In either case the ability of the micro-organism to cause an immune response is preserved, while its ability to cause disease is removed.

<sup>3</sup> A component of an invading micro-organism that is recognised by the body's immune system as being foreign and induces an immune reaction.



## The vaccine market

- Western Europe<sup>4</sup> is one of the world's leading markets for veterinary medicines and vaccines. The total European animal health product sales amounted to \$ 4,800 million in 2004, representing **35%** of the worldwide sales.<sup>5</sup> Vaccines accounted for **24%** of this European market in 2004, parasiticides 27%, antimicrobials 21%, topical products 7% and other products 21%.<sup>6</sup> In comparison, the animal health market in Western Europe represented approximately **3.3%** of the human medicines market in 2004.
- The development and registration costs to bring a new product to market are very high, particularly those from high-tech sources. Typically, the research and development programmes needed to take a new product from its discovery to the market cost up to **€ 50 million** and take **between 5 and 11 years** to complete.
- The veterinary vaccines market is relatively small and highly fragmented. It calls for individual vaccines covering a wide variety of species, each with a multiplicity of diseases. This imposes demands and hence costs on the veterinary vaccine sector, which are absent from many other product ranges.

## Future perspectives

- While at present vaccines are not available for all infections, access to modern research into vaccines holds great promise and opportunity for the future, as new techniques are mastered. These relate not only to new disease applications and prolongation of immunity, but also to better practical aspects, such as product stability and less dependence on cold-storage. Present and future immunological products increase the ability to keep animals healthy rather than awaiting the onset of disease and its associated negative effects.
- Modern research contributes to the economics of farming, to livestock welfare and to companion animal health. With improvements in vaccines and reduction in "cold-chain" requirements, it should become possible to include more animals in vaccination programmes in developing countries. This will contribute to better standards of animal health and farming prosperity, which in turn benefit human health and can decrease the cost of producing safe food.

<sup>4</sup> Western Europe includes EU-15, Norway, Switzerland, Iceland and Greenland.

<sup>5</sup> Wood Mackenzie, 2005

<sup>6</sup> Data coming from 14 IFAH-Europe/CEESA members, representing 95% of the European animal health market over 15 countries (UK, F, D, I, E, PT, NL, B, A, CH, DK, GR, IR, PL, HU)



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