**Vaccination of Farm Animals**

Briefing Document No.22

**What can diseases can vaccination prevent?**

Vaccination protects hundreds of millions of animals worldwide from disease and possibly death.

Animals, just like humans, suffer from a range of infectious diseases. As veterinary medicine has advanced, prevention of disease has become a priority as healthy food comes from healthy animals. One of the best means of preventing disease is by creating immunity in the animal. This is usually achieved by vaccination.

The principle of vaccination has been established for over 200 years. Since those early days, enormous strides have been made in the development of vaccines which have helped to prevent and in some cases eliminate many diseases in humans, farm animals and the family pet. Animals which develop disease often require treatment with medicines so vaccination helps reduce the amount of pharmaceuticals used in the treatment of animals. Vaccination presents no hazard to consumers of produce from vaccinated animals.

Not all animals need every vaccine. Some, like clostridial disease prevention, are basically routine, just like childhood vaccination programmes. The vaccination programme chosen for farm animals depends on the management system, the location of the farm and the history of the herd or flock (and whether or not a disease is likely to be encountered). Most farm animals are young, and these animals (just like children) are often more susceptible to infection. So, for example, calves often need to be protected by vaccination against respiratory disease. Some of the diseases that can be prevented are shown overleaf.

**How do vaccines work?**

Vaccines stimulate the body to produce its own defence against infection. Mimicking what happens when an animal has been exposed to disease, the body and its defensive system will "remember" the identity of the invading organisms. So, the animal comes into contact with a disease, its body is ready to fight it and the animal will not fall ill and suffer. This protects the individual animal and because this animal will not develop the disease and will not become infective, it will also help protect the population from the disease - 'herd immunity'.

A vaccine may consist of live but attenuated viruses or bacteria, or killed (inactivated) viruses or bacteria, or parts of them. "Killed" or inactivated vaccines are prepared from killed organisms (virus or bacteria) or fractions of the organism incapable of causing disease. They generally provide a short period of immunity.

In attenuated vaccines, the immunising agent (antigen) is an organism such as a virus, bacterium or parasite which has been modified to stimulate the production of the appropriate antibodies without causing the disease. Live vaccines are particularly effective in providing long-term protection, because they are a more powerful stimulus to the immune system. They are also more versatile in their route of administration.

Biotechnology can provide vaccines for diseases which cannot be controlled by conventional vaccine technology and create more specific, better defined products with even greater safety and efficacy.

Vaccination can be by a wide variety of routes: through water, baits, airspray, eye inoculation, intranasally, orally or using the more classical injection.

Achieving initial immunity may require more than one injection. Once established, this can be boosted by subsequent vaccination, as required. Modern vaccine research and technology means that some vaccines can actively protect against a variety of diseases, in a single product. These are called multivalent vaccines and using these reduces the number of injections, broadens disease protection - and helps reduce costs to the farmer.

**How are vaccines controlled?**

In the early days vaccination was risky. Vaccines were crude, using cultures or suspensions of diseased material treated to reduce infectivity. Some of the impurities in the injection also produced unwanted side effects.
But now, through much development work by vaccine manufacturers, risk from the immunising agent has been decreased while its efficiency has been increased. Present day vaccines are safe and effective having been designed specifically to avoid side effects and residual virulence. The advent of biotechnology has opened new doors to even more exciting developments.

Whether for disease prevention or treatment, the veterinarian, the animal owner and the public all have a right to expect that the research, development and bringing to market of animal medicines is reliably based on the triple standards of quality, safety and efficacy. The extremely stringent requirements for product registration set down in European law reflect this. If these requirements are not met, a vaccine will not be allowed on the market. Careful monitoring and review of products and disease patterns ensure that once on the market, vaccines remain safe and effective. There are very strict quality control processes to guarantee the safety and efficacy of each dose of vaccine.

Today’s vaccines are very effective and have a remarkably high safety record. Millions of doses are used annually in the UK alone. The use of vaccines has brought significant levels of control against diseases that farm animals previously suffered.

There is a constant quest for new preventive measures to meet the changing challenges to animal health. Indeed the diseases threatening animals evolve themselves; just like with human influenza, when the medical profession needs to be prepared with a vaccine to counter the particular strain that is prevalent at the time.

So the work goes on, as animal medicine companies continue to look for new vaccines to help farmers protect their animals. Vaccines, when available, provide a safe and effective answer to many animal welfare problems and represent an important field of ongoing research.

A table showing diseases which are controlled by vaccines in the UK along with other case studies, can be found on the NOAH website www.noah.co.uk

What is NOAH?

The National Office of Animal Health (NOAH) represents the UK animal medicine industry: its aim is to promote the benefits of safe, effective, quality medicines for the health and welfare of all animals. Its members supply over 90% of the UK licensed animal medicines market for pets, working and farm animals.

CASE STUDIES

Case Study 1: Clostridial disease in sheep and lambs

Clostridia are soil dwelling bacteria that can enter sheep even as they graze. They pose a constant and serious threat to flock health: before the introduction of vaccines they were causing losses of up to 50% of lambs. The potential for this remains. Onset is sudden, death is rapid and there is often no opportunity for successful treatment - flock vaccination provides the only method of control.

Clostridial vaccine manufacturers report that farmers who make mistakes in their vaccination regime - or are prevented by organic production contracts from using the vaccines routinely - can find that sudden and large scale losses with clostridial diseases such as pulpy kidney or braxy occur.

Luckily clostridial vaccines, administered in the proper way, make this scenario much less common.

Case Study 2: Newcastle Disease

Newcastle disease is caused by a highly contagious virus which not only affects poultry (chickens in particular) but also can exist in carrier state in wild birds. Although endemic in many countries of the world the UK has been free of the disease for some years. There is no treatment, but the UK's disease free status is maintained by routine vaccination, usually via the drinking water or by coarse spray, although sometimes intranasal or intraocular vaccines are given.

Case Study 3: Leptospirosis

Leptospirosis occurs in 60% of UK dairy herds, is an important bacterial disease of cattle and can lead to significant economic losses through symptoms as varied as abortion, reproductive failure and loss of milk production. Leptospirosis can also be transmitted from cows to humans where it can cause a flu-like syndrome. Vaccination against leptospirosis will protect cattle from developing the disease and thus economic benefits for the farmer. Vaccination also has human health benefits as it will prevent transmission to farm workers.

Case Study 4: Salmon Vaccination

Furunculosis has been present in wild salmon since the 1800's. With the advent of salmon farming the disease became a serious problem causing significant losses. In the late 1980's the viability of the industry was threatened by this endemic disease problem. The industry invested very heavily with government backing and developed a unique vaccine based upon special antigens linked to the infection mechanisms of the bacteria causing the disease. This vaccine was introduced in the early 1990's and in conjunction with good husbandry measures resulted in a dramatic turn around. Mortalities to the disease are now almost unknown and welfare of the farmed salmon is greatly enhanced.

For more case studies, see the NOAH website www.noah.co.uk

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