

Animal viruses: Introduction

Welcome! Today we will see a brief introduction on animal viruses.

Viruses that affect animals are very different: they have DNA or RNA genome, single or double-stranded, with or without envelope and may affect all known animal species, including both vertebrates and invertebrates, terrestrial and aquatic. It is often considered that all animal species can become infected by at least one virus. This gives us an idea of the millions and millions of viruses that circulate throughout the world.

But, can the same virus infect different animals? And, does it always cause disease?

Not all viruses behave the same with respect to the ability to infect animals. Thus, some viruses, called "**generalists**", can easily infect different animal species. This is the case of the influenza virus that can affect birds, pigs, horses, etc. or the rabies virus that can affect all mammals. Other viruses on the other hand, have a very **restricted host pattern**, i.e. they infect a single animal species, as for example retroviruses: those that infect cats cannot infect ruminants or horses. This different ability is closely related with the molecules that viruses bind to initiate infection in cells, which are known as receptors. If the receptors are present in the vast majority of eukaryotic cells, it is easier for the virus to infect many different animal species.

On many occasions, viruses cause **disease** in the animals that they infect, and even their death. However, some viruses are adapted to their host and they do not produce any harm. This is the case of the viruses that are transmitted by the bite of infected arthropods (to which they do not cause any harm) to vertebrate hosts (in which they cause disease). It is the case of the viruses that cause West Nile fever in horses or the blue tongue in sheep, which we will see in different videos.

Occasionally, viral diseases can have a big impact on **livestock** farming, due to losses in production meat, milk, eggs, etc., or due to the direct death of the animals, or because they are easily transmitted between them, and it is very difficult to control them. Some examples that we'll see are foot and mouth disease, African swine fever or avian influenza.

Some viral diseases are very severe for our **pets** (this is the case of distemper in dogs or equine viral arteritis).

Other viral infections have had great impact in **wild animals** and can alter the balance of the ecosystems. This has happened with the infection by ranaviruses in amphibians, viral haemorrhagic septicaemia in trout, or myxomatosis in rabbits.

Simultaneously to the better understanding of viruses and diseases, diagnostic methods, available vaccines, and prevention and control measures have been improving. This is especially important in diseases that are easily transmitted among animals and are very contagious, those that produce significant losses in livestock or serious diseases in pets, and that can be transmitted to people directly or by consumption of foods (which are called **zoonoses**). To give you an idea, thanks to vaccination we have been able to eradicate from the world one of the most severe viral diseases known: rinderpest, what we'll see in one of the videos.

The fight and control of viral diseases in animals has always been a priority for veterinarians. To that end, early in the 20th century an international body was created that it is now called **World Organization for Animal Health (OIE)**. The OIE, which is the equivalent of the human WHO, receives from its member countries notifications of the so-called "notifiable diseases" (which include the most dangerous and difficult to control, such as rabies, swine fevers, influenza, etc.), since a coordinated effort between countries is essential to avoid its spread to other regions. Once the disease has been detected, measures to be applied can be: isolation of animals, their

vaccination, or in the most extreme cases, slaughtering of infected animals to preserve the health of the flock or people. You will see examples of all this in the various animal species that we include in the course.

In recent years, the scientific community has understood that the fight against viral diseases, similarly to that against bacterial and parasitic diseases, must include animals, people and the environment. It is what constitutes the concept **One Health** (one world, one health).

If you want to know more about the fight and control of animal diseases and the One Health concept, you can consult the additional information and the website of the OIE, WHO and FAO.

In this course, you will know the main viruses and the diseases that they cause in domestic animals, both livestock and company animals, and in some wild animals. In every animal species that we have chosen, you'll see the most representative viruses and some of the most relevant diseases.

We hope that you like it!