Module # 8 – Component # 3

Viral Diseases of Wildlife

Objectives

To be able to identify the symptoms of important viral diseases of wildlife and to understand the control of these diseases.

Expected Outcomes

- List the most common symptoms of various important viral diseases
- Know how these diseases are transmitted
- Assist veterinarians in the control of these various diseases
**Rinderpest**

This disease was introduced to Africa, firstly in 1884 from the Middle East by the Italian military. This transmission died out in the Sudan in 1884. However it was again the Italian military who introduced it again in 1889 again from the Middle East, but this time into Ethiopia. Seven years later it was in Southern Rhodesia (now Zimbabwe) thanks to oxen transport.

Seeing the spread of the disease, a 1000 Km fence was erected across the whole of South Africa north of the Orange River. This was done with the hope that the disease could be stopped by not allowing any animals across the fence line. It crossed into the Cape (in 1896) through Aliwal North, presumably by local farmers.

Why was this such a problem? Rinderpest has a very high Morbidity Rate, which means it is exceedingly contagious and transmits before the host shows symptoms. The Mortality rate at this time was greater than 95%. It affects cloven hooved animals, with cattle and buffalo being particularly susceptible. Rinderpest is remembered as the worst animal Pandemic in recent history Killing 99 % of all the cattle and buffalo on the African continent.

When it had run its course only 50 buffalo were left alive south of the Equator. Game animals were unjustly blamed for its spread.

One positive (or negative depending on your point of view) event can be attributed to the disease though, by killing off such vast numbers of animals, specifically the buffalo and some other species, the Tsetse fly found itself without a host and vast areas of previously uninhabited land became available.

This deadly disease is highly contagious and only affects cloven-hooved animals. A single virus causes it although different strains exist. These strains differ in their ability to cause disease, their ease of transmission and affinity for various hosts.

**Infection is through inhalation. Clinical symptoms** include:

- Acute fever reaction
- Watery to purulent eye and nose secretions
- Difficult breathing
- Constipation followed by diarrhoea
- Ulcers in the mouth, gums and on the tongue
- Dehydration
- Death after 6 to 12 days
- Mortalities greater than 80%
Some animals take months to recover and can act as carriers of the disease.

On the 25th of May 2011, the following Press Release was provided:

Animal health delegates meeting in Paris today declared that rinderpest, a highly contagious disease in cattle and other animals, is eradicated, marking the first time humans have snuffed out an animal disease in the wild.

The delegates, during the annual World Organization for Animal Health (OIE) conference, unanimously adopted a resolution that officially recognizes that all 198 countries that have animals susceptible to rinderpest are free of the disease, the OIE said in a press release.

**Today's eradication declaration is only the second time humans have eliminated a disease. The first was smallpox in 1980.**

Dr Bernard Vallat, the OIE's director-general, said in the statement that the eradication declaration is a historic event. "It's a major breakthrough, not only for science, but also for the cooperation policies amongst international organizations and with the international community as a whole," he said. He credited the world's veterinary community, which had faced tough obstacles, given that many affected countries had scarce resources for fighting the disease.

In October 2010 the United Nations Food and Agriculture Organization (FAO) set the stage for official eradication when it announced that animal health authorities were ending all field activities to control rinderpest. The virus doesn't infect humans, but the ancient disease has been considered a potential biological weapon because of its devastating effect on cattle and buffalo herds.

Over many centuries rinderpest outbreaks caused widespread famine and struck down millions of domestic and wild herds in Europe, Asia, and Africa. Though the disease never gained a foothold in the Americas, Australia, or New Zealand, veterinary experts worried about rinderpest's spread to the areas, because the regions' cattle herds are naïve to the virus.

Ann Tutwiler, FAO deputy director, said in the statement that eradicating rinderpest has been one of the FAO's top priorities. "With the eradication of the disease in live animals livestock production around the globe has become safer and the livelihoods of millions of livestock farmers are less at risk," she said. "There are important lessons to be learnt when it comes to defeating other animal diseases."

The FAO is expected to adopt a similar measure in June at its conference in Rome. It will also discuss a follow-up plan for maintaining rinderpest eradication.

**Several labs still keep rinderpest virus stocks for vaccine production**, so as a next step the OIE and FAO are preparing recommendations on limiting use of the virus only for vaccine research, in compliance with international biosecurity measures, the OIE said.
Rinderpest eradication efforts have been under way since 1989, when the OIE launched a system for countries to reach the disease-free status. The FAO's Global Rinderpest Eradication Program has also played a vital role in eliminating the disease.

Rinderpest was a **notifiable disease**.

**Previous Control measures included:**

- Quarantine
- Culling of infected animals
- Precautionary vaccination
Foot-and-Mouth Disease

One virus causes this highly contagious disease of cloven-hooved animals although several different strains are identified. Infection is primarily via inhalation although infection via the mouth is also possible.

This disease is endemic in certain areas in South Africa. This means that the disease is present in these areas at all time. The disease is thus constantly present in these animal populations, but clinically recognizable in only a few individuals.

Buffalo are seen as the most important carriers of foot-and-mouth disease in the endemic areas, although cattle that have recovered from the disease are also important carriers.

Clinical symptoms include the following:

- Classical blisters on the tongue, gums, in the mouth, the nose, between and on the hooves, and on the udder and teats.
- These blister rupture to leave raw ulcers in the above mentioned areas
- These ulcers become secondarily infected with bacteria
- Depression and feverish
- Excessive drooling
- Lameness
- Low mortality (number of deaths) even though the morbidity (number of animals infected) is very high

The disease is not a great killer but is of great economical importance. Countries that are free of this disease have very strict meat import regulations. No livestock or meat from endemic areas are allowed to be exported to these countries. The deaths that do occur are as result of heart muscle involvement or due to secondary infection.

The Kruger National Park and surroundings are endemic areas in South Africa. Movement of livestock or meat from this area is only allowed under instruction of Directorate of Animal Health.

Foot-and-mouth disease is a notifiable disease and the collecting and sending of samples are only to be done under supervision of a State veterinarian.

Control measures include:

- Quarantine. Includes restriction of movement of people, vehicles and animal products such as hides and horns
- Culling of infected animals
- Vaccination of all ruminants
It is of great importance that game ranch owners understand the necessity for restrictions in endemic areas as this has a real influence on the livestock and game enterprises in the rest of the country. Information regarding these restrictions can be obtained from the local state veterinarian.

In late 2000, South Africa experienced a significant outbreak of the disease which resulted in the temporary suspension of our meat exports. The situation was controlled and contained, and the export ban lifted.

The procedure when an outbreak occurs, is to destroy all the animals on the infected farm and all the animals on surrounding farms. In addition all transportation into and out of the area is halted until the disease has been contained.

Since buffalo are wild carriers (but not sufferers of the disease) Veterinary cordon fences should be erected with a 5 Km (2 mile) radius around reserves with infected animals.
Bovine Malignant Catarrhal Fever - Snotsiekte

This acute disease occurs **commonly in cattle** and from time to time in other **ruminants**. It is **usually fatal** and only a few individuals are infected at any given time. Several strains of the virus have already been identified.

There are two forms of the disease. Firstly, the **African form** where **contact** between cattle and blue- or black **wildebeest is necessary for transmission** of the virus. The **European form** is transmitted between sheep and cattle.

The **exact mode of transmission** between cattle and wildebeest is **not known** yet but there is a **definite increase in cattle cases during the wildebeest calving season**. There does not have to be direct contact between the two species and there is also **no transmission between cattle themselves**. Transmission is likely to be through an **unknown vector**.

The virus is **endemic in wildebeest populations** and almost all animals tested were positive carriers. There are **no clinical symptoms** in wildebeest or any other game species for that matter.

**Cattle die acutely** from this disease and show the following clinical symptoms:

- Fever
- Enlargement of lymph nodes
- Watery to purulent eye and nose secretions

There are **no more strict control measures on the movement and/or keeping of blue and/or black wildebeest**.

The Afrikaans form of the name – ‘**Snotsiekte**’ is colloquially translated as mucous sickness – an obvious reference to the infected animals **nasal secretions**.
African Swine Fever

This deadly disease of domesticated pigs is highly contagious. Warthogs and bushpigs act as carriers of the virus and do not develop any clinical signs. Domesticated pigs become infected when feeding on dead warthog or bushpig tissue, or when bitten by the warthog tampan (a type of tick, external parasite) Ornithodorus porcinus. These tampans live in the burrows of the wild pigs. Warthogs thus do not transmit the virus directly to domesticated pigs but carry the infected ticks and spread the virus indirectly in this manner.

After infecting domesticated pigs the virus spreads quickly through the whole piggery since high concentrations of the virus are shed in all bodily excretions.

The disease in domesticated pigs present in four different ways:

- **In the peracute form** the affected pigs are found dead
- **In the acute form** the pigs are initially feverish, stop eating, become weak and have a staggering gate. Vomiting, bloody diarrhea, purulent eye and nose secretions, and a blue discoloration of their ears, feet and tails may be noticed before the animals eventually dies
- **In the subacute form** the sows can abort and death occurs after three to four weeks
- **The chronic form** of the disease is very similar to other diseases and is for this reason difficult to identify. Symptoms could include pneumonia, emaciation, joint infections and/or ulcerative skin conditions.

African swine fever is a notifiable disease and strictly controlled. Control measures include:

- Restrictions on movement of wild and domesticated pigs as well as products of pig origin
- Culling of all infected and in-contact pigs
- Prohibit contact between wild and domesticated pigs
African Horse-sickness

This disease is **not contagious and horses can not infect each other directly**. The virus is **transmitted by biting midges** (a small mosquito-like type insect) from the genus *Culicoides*. The disease **spreads** either by **movement of infected hosts or of the midges**. It can spread over great distances if equine animals incubating the disease are transported by vehicle, ship or aircraft. Because the disease is transmitted by midges, it **has a seasonal occurrence** and its prevalence is influenced by climatic and other conditions that favour the breeding of *Culicoides* species.

The disease kills horses in one of two forms, either by a **swelling of the head** or **pulmonary (lung) problems**.

Zebras can become **infected but are highly resistant** to the disease and do **not show** any **clinical symptoms**. Zebra foals receive immunity from their colostrum and then develop full immunity.

Dogs feeding on **infected horsemeat** can become ill. It is not known if other carnivorous animals can be infected. For this reason it is advised that infected horsemeat should not be fed to wild carnivores.

This disease has **little direct wildlife ramifications**, except for **horseback safaris** and **horseback patrols** through game reserves.
**Rabies**

This **acute, deadly disease** affects all warm-blooded animal species. Several different strains of the virus are identified.

Animals become **infected** with the virus **when bitten by an already infected carrier animal**. The disease can however also be transmitted through close **contact with saliva** from infected animals. This was the case in Namibia where **kudu became infected** through **eating leaves contaminated with infected saliva**.

The most important transmitters of rabies in South Africa are:

- Domestic dogs (*Canis domesticus*)
- Yellow mongoose (*Cynictis penicillata*)
- Black-backed jackal (*Canis mesomelas*)
- Bat-eared fox (*Otocyon megalotis*)
- Honey badger (*Mellivora capensis*)
- Small spotted genet (*Genetta genetta*)

It is however important to realize that all warm-blooded animals are potentially capable of transmitting rabies.

The interval of time between the invasion of the body by the rabies virus and appearance of the first signs of disease is known as the **incubation period** of the disease. The incubation period of rabies **varies tremendously** depending on:

- Degree of **virulence** (ability to cause clinical disease) of the specific strain of virus
- **Amount of virus transmitted**
- Severity of the **bite-wound**
- Nervous supply to the area where the animal was bitten
- Distance from bite-wound to the animal’s brain

It can be as short as **21 days to as long as 1 – 2 years in animals and up to 20 years in humans**.

Rabies is a **progressive disease** and can be divided into **three phases**:

- Initial phase
- Aggressive phase
- Paralysed phase

Clinical symptoms during the different phases are:
Initial phase:

- **Behavioural changes**, i.e. wild animals lose their fear of humans and appear tame
- Excessive **drooling**
- Decreased appetite
- Increased libido
- Erections in male animals
- Increased urination
- Animals either become aggressive or paralyzed after this phase

Aggressive phase:

- **Infected animals will attack other animals without reason**
- Anxious facial expression
- Eating or chewing strange objects
- Run around aimlessly

Paralysis phase:

- **Dropped bottom jaw**
- Excessive drooling
- Progressive paralysis
- Abnormal sounds

The **virus lives in the nervous tissue and saliva** and migrates from the saliva to the brain via nerves, **causing brain damage**. From the brain it is transmitted back to the saliva via nerves.

When an animal is suspected of being rabid, do not attempt to catch or inspect it. Rather contact the nearest veterinarian or preferably the relevant state veterinarian. **The confirmation of the diagnosis is made on the animal’s brain tissue in the laboratory. It is for this reason that a suspected case of rabies should not be killed with a shot to the head.** The removal of the brain and sending of samples are best left to a veterinarian.

The **emergency treatment** of a person bitten by a suspected rabid animal consists of:

- Rinsing the wound with large amounts of water with or without soap
- Removing any foreign matter from the wound
- Do not stop the bleeding immediately as this is advantageous for the patient unless the bleeding is profuse
- Get the patient to a doctor as soon as possible
- The animal should be killed and a veterinarian should send appropriate samples to confirm if the animal is suffering from rabies
- There is a course of modern drugs available to treat the disease,
Control measures for rabies include:

- **Regular compulsory vaccination of all dogs and cats**
- Preventative vaccination of any other animal species is only permitted with the consent of a state veterinarian
- The vaccination of people by their doctor is voluntary but it is advised that people who work with animals regularly be vaccinated
- Control of stray dogs and cats
- The **control of other transmitters of rabies** such as black-backed jackals and yellow mongooses is **very controversial**. It is only effective in the short-run as the remaining animals will increase their reproduction rate to such an extent that the total population can actually increase.
- Trials in which bait, containing a vaccine, are placed out for transmitter animals are being done elsewhere in the world and will probably be tested out in South Africa as well.

**Rabies is a notifiable disease ➔ All suspected cases must be reported to the state Veterinarian.**

Certain relatively isolated populations of the **yellow mongoose in the Karoo** and **bat-eared-fox in the Western Cape** harbour the disease. **Wild dog** are highly susceptible and many packs are wiped out due to it. This is the major reason why **domestic dogs are prohibited from game reserves**.
Carnivore Viral Diseases

Introduction

Carnivores don’t suffer as much stress as herbivores (a predator / prey phenomenon) and therefore do not experience as much sicknesses as herbivores, even when in confinement.

Disease in carnivores is broadly (but not strictly) grouped into two taxonomically.

Canidae (dog family) Diseases

- Distemper
- Parvovirus

Felidae (cat family) Diseases

- Feline leukaemia
- Panleukopenia
- Rhinotracheitis
- FIV – Feline Immuno Virus, Feline AIDS

Distemper

This disease is in the same family as Rinderpest and common human measles. It is a contagious disease with no vector. It is found in domestic dogs, wild dogs, jackal, foxes and mongooses.

Clinical symptoms include

- Human flu symptoms
- Pneumonia
- Diarrhoea
- Encephalitis
- Convulsions
- Brain damage

Zoos and other confined situations may experience significant outbreaks, especially those close to cities, where transmission from infected domestic dogs are a risk.

Strangely enough there has been a case of 40 lion being killed by distemper, which until then was strictly known as a disease of Canids (dog family) only
Parvovirus

The virus causes suppression of the immune system. It is characterized by both a high morbidity and high mortality. The virus is a mutant strain / variant of the feline Panleukopenia virus.

Because it is a virus, there are no antibiotics available, although a vaccine exists. Wild dog are particularly susceptible.

Feline Panleukopenia – cat flu

This virus causes a white cell deficiency in affected hosts leading to immunosuppression. The disease is also characterized by high morbidity and mortality and may exhibit in either an acute or chronic form. It causes vomiting in domestic cats.

It has no vector and transmission is not fully understood. The virus can live ‘free’ in the environment and therefore is difficult to control both in terms of control and spread. All wild felines are susceptible. There is a vaccine, but it is not safe to use it on either cheetah or black footed cat.

This disease is not of great importance to wildlife, but has been used in bio-control programmes, specifically the attempted eradication of feral cats from Marion Island, south of South Africa.

Feline Immuno-deficiency Virus - FIV

This has also been somewhat incorrectly described as feline AIDS. It is very similar to the HIV strain, but affected hosts do not seem to experience the same debilitating symptoms.

In preliminary field tests, 80 % of Kruger National Park lion as well as one leopard and one cheetah tested serologically positive for the disease. The main concern that this could destroy the affected populations is unfounded. The reason being is that unlike humans with HIV, felines with FIV are reproductively active before any effects of the disease manifest. Therefore they continue to propagate.

The disease is likely to have an as yet unidentified wild reservoir. The disease is a growing significant problem for domestic cats in the USA.
Feline Leukemia

This disease like many affecting Felidae is also an Immuno-suppressant. It is characterized by a proliferation of white blood cells, but in an abnormal form.

It is not significant for wildlife.

Rhinotracheitis

This disease presents with flu-like symptoms in both domestic and wild felines. It is not a fatal disease and a vaccine is available.

It is also not a significant illness with reference to wild animals.

Conclusion

Feral cats and mice are likely to be the most important vectors of many of these diseases. These animals are also quite prevalent in zoo at night, and cannot be effectively controlled in or out of wildlife areas. Therefore feral cats should be regarded as vermin within the borders of formal conservation areas and should be eradicated. Their vector status is also the reason why domestic cats are not allowed into wildlife reserves.

Disease in carnivores, although far less significant than disease in herbivores does require attention by wildlife managers.