Module # 8 - Component # 2

Bacterial Diseases of Wildlife

Objective

Identify the symptoms of important bacterial diseases of wildlife and to understand the control of these diseases.

Expected Outcome

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

Giraffe: *Giraffa camelopardalis*
Anthrax

Anthrax is a peracute, acute or chronic (these terms are explained below), highly contagious disease of domestic and wild animals and humans caused by the spore-forming bacteria *Bacillus anthracis*. All mammals are susceptible, but it would appear that kudu, giraffe and buffalo are the three game species that are highly susceptible to anthrax.

This disease still occurs virtually worldwide. It is common in southern and eastern Europe, the Russian countries, southern and central America and Asia, and is endemic to South Africa. Anthrax is a notifiable disease – this means the relevant state-veterinarian must be notified if a case of anthrax is suspected.

**African buffalo:** *Syncerus caffer*
This bacteria forms spores when it meets aerobic conditions. For this reason, the carcass from a suspected case of anthrax should not be cut open as this would cause the bacteria to sporulate and release millions of spores into the environment. These spores are highly resistant in the open environment but are rapidly killed in the carcass through a process known as putrefaction. Water sources and the soils are contaminated through the dead carcasses.

Spores can be transmitted mechanically through animals such as hyenas and vultures, blowflies and even people. Animals that enjoy mud-baths such as warthogs, elephant and buffalo can also spread the spores from one waterhole to the next. Blowflies feeding on infected carcasses regurgitate this material on leaves in the vicinity and antelope feeding on these can become infected. Animals can also become infected when chewing on bones of infected carcasses during the winter as result of phosphorous deficiency. The practice of eating bones (specifically by herbivores) is known as osteophagia.

### Clinical symptoms of Anthrax include:

- **Peracute deaths** (ruminants). Animals collapse usually in less than 2 hours without showing any symptoms. Terminal suffocation, convulsions and congested mucous membranes may be seen. Blood-stained fluid sometimes exudes from the nostrils, mouth and anus.

- **Acute deaths** (ruminants and equids). The course of the disease is usually less than 3 days. Animals are depressed and weak and have difficulty breathing. They show decreased appetites with digestion disturbances and occasionally bloody diarrhoea. Small pinpoint bleedings may be seen in the mucous membranes. The animal’s milk is blood stained or yellow, and abortions can occur. Swelling of the tongue and subcutaneous tissue especially in the region of the throat and lower parts of the thorax and abdomen may occur.

- **Subacute to chronic** anthrax (omnivores, carnivores and partially immune animals). The course of the disease extends for more than three days before recovery or death sets in. The most common sign is a swelling of the throat and neck. This swelling can be so severe that the animal struggles to breath, eat or drink. The infection may remain localized or spread systemically, which is often fatal. Digestion disturbances such as loss of appetite, vomiting, bloody diarrhoea and depression may be evident. Some of these animals can recover and some can be carriers of anthrax.

The anthrax bacteria produce toxins creating conditions in the animal’s body that are advantageous for the replication of the bacteria and it provides protection against the animal’s defence mechanisms. The animal then dies due to secondary shock. A veterinarian can confirm the diagnosis by making a blood smear and examining it under a microscope.
Control of anthrax

- **Notify** relevant State veterinarian. All control measures will be under their supervision.
- In an outbreak **quarantine the farm or an area** around the outbreak.
- **Immunize all game** as well as livestock in the area. Annual revaccination is recommended.
- Carcass management. **Do not open the carcass!** Either **incinerate** the intact carcass, or if this is not possible they should be **buried** at a depth of two metres (6 ft.), after being **covered** liberally with a mixture one part of chloride lime, containing at least 25% active chlorine to three parts of soil before the grave is filled in. All excreta, blood and other possibly contaminated material must be disposed of in a similar manner.
- On **hunting reserves** it is important to **trace all wounded game**, to ensure that vultures are not lured onto the ranch.
- **Sick animals** can be treated with **antibiotics**.
- **Supply extra phosphorous** during the winter months in the form of a game block, to negate the need of animals engaging in osteophagia.

Anthrax the Future

Anthrax spores are extremely hardy and may remain in the soil, dormant for decades or even centuries, until the correct or favourable conditions are prevalent. Because of this, anthrax will **never be completely wiped out** and wildlife managers will have to deal with sporadic (pun intended) outbreaks.

Cement water cribs can be chemically scrubbed and disinfected, but the main problem is with gravel (sand) watering pits and waterholes, especially those that fill and dry up periodically. Control at these points is impossible. Managers and other reserve personnel just need to be **vigilant and act quickly** when an outbreak occurs.
Tuberculosis

Several bacteria of the genus *Mycobacterium* cause this disease. Important species are:

- *Mycobacterium bovis* (most important)
- *Mycobacterium tuberculosis*
- *Mycobacterium avium*

When an animal *coughs*, bacteria is *released in small droplets* into the air. If a *nearby animal inhales these droplets they become infected*. Excreta such as milk, urine and faeces can also spread the bacteria. *Calves* can thus become *infected* through their dams’ *milk*.

The inhaled bacteria are taken up by cells in the *animal’s lungs* which release substances that will draw other cells to the inflammatory zone. This process results in the *death of lung tissue* that calcifies to form the easily identifiable tubercle lesions.

Tuberculosis is *highly contagious and spreads fast* in an outbreak. All animals, even *predators* can become infected, although it would appear as if *kudu* and *buffalo* are highly susceptible.

**Clinical symptoms include:**

- Coughing when tubercles are formed
- Lymph nodes that drain infected tissue/organs enlarge and can even burst
- Emaciation and a dull coat in chronic cases

These signs are *not often seen and if so only in very advanced cases*. Blood tests are not very sensitive as false negatives do occur.
Control measures include:

- Separate wildlife from cattle that might be infected with the bacteria.
- If cattle are kept on an adjacent property they must be tested annually.
- Cull emaciated game with dull coats and get a veterinarian to do a post-mortem.
- Vaccinate valuable and endangered game species.

In the Kruger National Park, the disease is endemic to both populations of buffalo and lion (the lion becoming infected by eating TB infected animals).

The phenomenon of affected buffalo has caused the Southern African populations to be divided up into two distinct groups of the same species,

- Disease – free buffalo
- Diseased or TB infected buffalo

Infected buffalo which are confined mostly to the Lowveld area of South Africa may not be transported out of this area. This has led to the disease – free populations being very much in demand and consequently of high value. This had affected the stocking of many new reserves, who find themselves unable to afford a decent size herd of buffalo, or even any at all.

African buffalo: Syncerus caffer
Brucellosis

Bacteria from the genus Brucella cause brucellosis, also known as contagious abortion. The normal route of infection is via the animals’ mouth, although infection through the eyes, wounds or reproductive organs is also possible. Males can transmit the bacteria through their semen during coitus.

The abortion material contaminates the veld. Scavengers then spread the bacteria further by moving this material elsewhere to feed on it. These animals themselves spread the disease through their faeces and urine and can thus act as a disease reservoir. Buffalo appear to be the most commonly infected host animal species.

After infecting the host, the bacteria spread via the blood to the uterus, milk glands, lymph nodes, spleen, liver and joints. In pregnant animals the placenta is also infected and becomes thickened and leathery, leading to abortion.

Clinical symptoms will depend on the organ system involved but includes the following:

- Ruminants abort during the second halves of gestation. This is more common in young animals especially during their first carriage
- Joints are swollen, and abscesses can form. Such animals become lame or move with great difficulty
- Clinical symptoms are not obvious in wildlife. A low calving percentage and aborted material in the veld can be a valuable indication

Several diagnostic tests are available for testing animals. This is best referred to a veterinarian. Results of treatment of positive animals with antibiotics are variable and practically challenging. It is for these reasons not advised.
Control should include:

- **Vaccinate all livestock** (cattle) **before** letting them **graze with wildlife** on the same veld
- **Burn all aborted material** in the veld
- Test buffalo before releasing them into previously infected premises
- This disease is **not of great importance in wildlife** and aerial surveys of population increase are the best management tool to quickly and correctly identify the problem

12% of buffalo generally make up the disease reservoir.

African buffalo: *Syncerus caffer*
Corynebacterium Infections

Bacteria from this group can infect animals through wounds such as tick bites. The animal’s body reacts by sending out defensive cells to take up the bacteria. This facilitates moving the bacteria deeper into the body forming abscesses. These abscesses are usually green or yellow and not malodorous.

Clinical signs will depend on the organ system involved but can include:

- Pneumonia
- Lameness (joints or spinal cord)
- Septicaemia (umbilicus)
- Mastitis (milk glands)
- Blindness
- Nervous symptoms

Diagnosis can be confirmed in the laboratory through bacterial culture. Treatment involves draining the abscess as well as a penicillin antibiotic injection.

Control should include:

- Isolation and treatment of infected animals
- Vaccination of susceptible animals. The immunity is of short duration and the timing must be such that the administration of the vaccines coincides with the peak incidence of the disease
- Good veld management to ensure that the animals are not nutritionally stressed, together with effective tick control
- Do not relocate animals from infected ranches
Botulism

A toxin produced by the bacteria Clostridium botulinum causes this disease. It occurs most often in ruminants and game birds although carnivores are also susceptible. The toxin is produced in anaerobic conditions such as in decaying carcasses as well as in contaminated stagnant pans. The disease is more common in livestock and occurs when the animals chew on contaminated bones from carcasses due to a phosphorous deficiency.

The disease is characterized by a progressive flaccid paralysis. Poisoned birds are lame, cannot fly and sit in a little heap with wings and neck flaccid on their sides. Livestock are vaccinated, carcasses are removed from the veld and measures are taken to ensure that pans and vleis are not infected.

An experienced wildlife veterinarian prepares to vaccinate animals
**Bacterial Disease in Captivity**

The keeping of **wildlife in bomas or small camps** can lead to several disease conditions. The stress brought about by changing the normal social hierarchy, the feed changes, unfamiliar surroundings, and presence of people all have a deleterious effect on the animals’ immune systems. Under these conditions bacteria can take advantage and cause the following two diseases:

### Foot-rot

*Fusobacterium necrophorum* is a normal inhabitant in the gastro-intestinal tract of ruminants. When animals are kept under conditions where they stand in faeces all the time, their hooves become soaked and soft and thus susceptible to infection. This bacterium penetrates the skin between the hooves and then spreads to the joint capsules and/or tendons.

**Clinically** the animals show various degrees of lameness and are reluctant to move. **Treatment** consists of the intra-venous injection of sulphur antibiotics. This is however not always practical in the boma set-up. Prevention by keeping bomas and small camps clean and dry remains the most effective way of control.

### Salmonellosis

Various bacteria of the *Salmonella* genus can cause diarrhoea in especially young animals. Infection is via the mouth after which the bacteria then multiply in the gastro-intestinal tract. They then produce toxins that can result in acute deaths. Certain animals will recover but the bacteria remain in some organs notably the gallbladder and are released from time to time in such an animal’s faeces. This animal is known as a carrier animal. Even people can act as carriers.

**Supportive treatment** is important. A vaccine for calf paratyphoid infection is available and can be used in wild ruminants.
Other Diseases of Wildlife

Several other bacterial and bacteria-related diseases affect wildlife, but are not considered of great importance:

**Ringworm**

This is caused by a fungus and its effects are dependent upon the health of the animal at the time of infection. It is found in all mammals.

**Sarcoptic Mange**

This is caused by a host-specific mite but is not endemic in South Africa. The affected animal’s coat is damaged.

**Greater Kudu: Tragelaphus strepsiceros**