

DISEASES

When the word buffalo was mentioned in the past, came to mind, diseases that these animals carry and transmit to domestic animals. Unfortunately, 80% of South Africa's total buffalo population are carriers of one of the four major diseases that can be passed on from wild to domesticated species. It is therefore important that the reader must have an understanding of the scientific background of these diseases. Diseases carried by the buffalo are divided in two groups, indigenous diseases that occurred in Africa to which the buffalo are adapted and can survive when infected. They stay carriers and can spread the disease to domestic animals. The indigenous diseases of buffalo in ranching conditions that play an important role are, foot-and-mouth disease, brucellosis, Corridor disease and Parafilariosis.

Foot-and-mouth disease

This is a highly contagious disease that is caused by the *Picornavirus* that affects cloven-hoofed animals like ruminants and pigs. It is characterized by a high morbidity (the number of animals affected), but a low mortality (number of deaths). The disease does not kill domestic stock but other countries do not want the African strains (SAT 1, SAT 2 and SAT 3) in their country. The importance of the disease lies in the fact that most countries do not want to import the disease via agricultural products as discussed in more detail in Chapter 5. Although the animals infected often do not die, there can be a great loss in production. Moreover, the livestock of countries outside Africa are often quite susceptible to this disease.

The most important clinical signs are vesicles and lesions that develop in areas with excessive movement such as in the mucosa of the mouth while ruminating and the inter-digital skin areas of the hooves when walking. The clinical signs of foot-and-mouth disease appear after an incubation period of two to eight days. The first clinical signs in the animal are dullness, loss of appetite, fever, a drop in milk production, and animals that stop ruminating. This is followed by lameness, unwillingness to stand, salivation and smacking of the lips. Lesions of the tongue occur on the tip and dorsal surface. These vesicles rupture easily, and when a person is handling the tongue, the epithelium will slough away easily, leaving a raw, bleeding surface. The foot lesions occur at the inter-digital spaces and the bulbs of the heel. The chorion band is a more common place for lesions in smaller species such as goats and pigs. Milk cows may show lesions on the teats, and a viral induced mastitis may occur.

The African buffalo is an important carrier of foot-and-mouth disease. In individual animals the virus may persist in the pharyngeal region for up to five years. There are seven serotypes of virus and at least 80 sub-serotypes.



Foot lesion (Source A. du Toit)

The mechanism through which the virus is spread from the buffalo to cattle is unknown. It can spread by direct or indirect contact, but the most common route is direct contact between animals that excrete the virus and infect other susceptible animals. Indirect contact can be through mechanical carriers or contaminated objects. The three most important factors that play a role in the transmission of the virus are; the quantity, duration and means by which the virus is spread into the environment, the ability of the virus to survive outside the animal's body and the quantity of virus required starting an infection.

All animal excretions and secretions contain the virus, with saliva having the highest concentration of virus. The virus is highly labile (weak) outside the animal's body, and it is susceptible to an acidic environment. Meat that is kept for 48 hours at 4°C will be free of the virus. However, the virus can survive in the lymph nodes for up to 120 days. At air humidity below 55.0%, the virus shows a poor survival rate, that explains why long-distance contamination does not occur in southern Africa, because of sunlight (ultra-violet).

Buffalo plays an important part in carrying the disease and spreading it to other species. The loss of income for any country through a ban on the export of agricultural products is detrimental to trade. Therefore, strict control measures are important when ranching with buffalo. The disease is controlled by the government, focussing on border control. Declared foot-and-mouth disease control areas are the Kruger National Park, the districts adjacent to the Kruger National Park, Mozambique, and a 10 to 15 km zone bordering Swaziland, Zimbabwe and Botswana.

The control measures are; at least monthly inspections of all cloven-hoofed domestic animals in controlled areas, keeping records of all livestock numbers on ranches, movement control by permits for animals and their products into and out of the controlled area, vaccination of susceptible animals within the danger zone, owners of the animals must report suspicious cases to the state veterinarian, quarantine of all cloven-hoofed animals that may leave the area, cattle leaving the area should be hot-branded with an F-symbol on the right side of the neck, to prevent them from being exported via export abattoirs and wildlife fences are erected between buffalo and cattle herds.

The diagnosis of foot-and-mouth disease is by the direct complement fixation test. This is a rapid and specific test. Isolation and characterization of the virus can be done with oesophageal-pharyngeal scrapings.

The differential diagnosis (disease with which the foot-and-mouth disease can be confused is); vesicular stomatitis that affects cattle, pigs and horses, swine vesicular disease that affects pigs, blue tongue that affects cattle and sheep, foot-rot, rinderpest that mainly affects ruminants and snotsiekte that affects cattle.



During outbreaks, a slaughter policy of all infected animals is imminent to limit the spread of foot-and-mouth disease from the foci of infection to susceptible animals. Vaccines can also be used, but the immunity period is usually short and the possibility of carriers may develop.

Tuberculosis

This disease in buffalo is caused by the bacterium *Mycobacterium bovis*, which is also responsible for tuberculosis in cattle. The disease spread from cattle to buffalo in the southern section of the Kruger National Park in the 1950s. Once a buffalo is infected, the infection spreads spontaneously within the herd. Studies done in 1998 indicated a regional infection rate of 42.0% for the southern district, 20.0% for the central district, and 1.5% for the buffalo in the northern district of the Kruger National Park.

The spreading rate of the bacteria in a herd is not known, but it can be assumed that the incidences will double every five years. The disease spreads when cough droplets in the atmosphere are produced by infected animals and are inhaled by others. Contaminated food and water can also be a medium of transmission. Lions that feed on contaminated buffalo carcasses also become infected with tuberculosis.

Tuberculosis is life-threatening to buffalo populations. The time from infection till death is unknown, but infected animals are known to survive for several years. Buffalo are a maintenance host for the bacteria. Therefore, buffalo do not need further exposure to infected cattle to maintain the infection. They are the ideal reservoir because large herds of a few hundred buffalo gather close to a waterhole and create the perfect mechanism for aerosol

transmission. It is known that other maintenance hosts infect the environment, thus making it impossible to eradicate the disease.



Tuberculosis in lioness (Source: D. Keet)

When tuberculosis reaches a specific level of prevalence in a buffalo herd, the infection apparently spills over to other wildlife. Animals that have probably contracted the disease from buffalo in southern African nature reserves are the lion *Panthera pardus*, cheetah *Acinonyx jubatus*, spotted hyaena *Crocuta crocuta*, baboon *Papio ursinus*, kudu *Tragelaphus strepsiceros* and black rhinoceros *Diceros bicornis*. Carnivores and omnivores contract the disease by ingesting infected tissue.

The clinical signs of tuberculosis are coughing and swollen lymph nodes that can rupture. In chronic cases, emaciation and a rough hair coat with hair loss can be seen. In dead animals the diagnosis can only be confirmed by means of a bacterial culture. It can take up to three months to isolate the bacterium. Diagnosis in the live animal can be done with the intra-dermal skin test, using avian and bovine tuberculin. This test will detect more than 90.0% of infected animals, but it must be repeated after three months. The gamma-interferon test is more sensitive than the intra-dermal test. The blood samples for the gamma-interferon test must reach the laboratory within six hours of collection to be of any diagnostic value.

There is no vaccine or treatment for buffalo with tuberculosis yet. Therefore animals from infected areas must be tested negatively three times, three months apart, before being certified as clean. If only one animal from a group test positive, it must be removed and the test procedure must start all over again.

Brucellosis

The disease is also known as contagious abortion (CA). It is caused by the bacterium *Brucella abortus*. The organism is usually transmitted orally, but in certain cases it is transmitted via the semen of infected males. Milk from infected cows can be a potential source of infection, too. Under certain circumstances wildlife can act as reservoirs for the disease. For example, the black-backed jackal, *Canis mesomelas* can pick up the organism when it feeds on the placentas or aborted foetuses of infected herbivores.

The most important sign of brucellosis is abortion in the latter half of gestation. Calves may also be born weak or immature, with retained placentas. Chronic infection in the joints leads to the classic house maid knees syndrome (hygromata) when the carpal joints are swollen. Infection of the testis, known as orchitis or epididymites, may also occur.

The age of an aborted foetus (t) can be calculated by using the following equation:

$$t = [W^{0.33} \div 0.1307] + 68 \text{ days}$$

where: W = body mass (g) of the foetus.

The above equation is not valid for foetuses weighing less than 170 g. However, if, for example, a rancher picks up a buffalo foetus of 20 kg, then the age (t) can be calculated with the following formula:

$$\begin{aligned} t &= (20\,000 \text{ g}^{0.33} \div 0.1307) + 68 \text{ days} \\ &= (26.3/0.1307) + 68 \text{ days} \\ &= 201 + 68 \text{ days} \\ &= 269 \text{ days.} \end{aligned}$$

It is important to handle aborted foetuses with care because brucellosis is a zoonosis. A zoonosis is an animal disease that is transmissible to humans. The organism localizes in the uterus, placentomes and inter-cotyledon areas, which become thick and leathery in appearance and interfere with the blood circulation of the foetus, eventually causing abortion. The diagnosis is done with the complement fixation test. Test titre values of below 30 are regarded as negative. It is recommended that breeding should only be done with buffalo cows with a nil titre.

Of a sample of buffalo from the Kruger National Park, 15.0% tested positive for brucellosis on a population basis. On a herd basis it varied from zero to as high as 85.0%. Breeding is not allowed with buffalo that test positive for brucellosis.

Corridor disease

“Buffelsiekte”, Afrikaans for buffalo disease, is an acute and usually fatal disease of cattle, caused by the protozoa *Theileria parva lawrencei*. It is transmitted by the brown ear tick *Rhipicephalus appendiculatus* from buffalo to cattle. This tick occurs in the eastern, wetter parts of South Africa. The disease is called corridor disease because of its occurrence in the former corridor region between the Hluhluwe-Umfolozi Park in KwaZulu-Natal.

The protozoan parasite is ingested by the larvae of the brown ear tick when they feed on an infected buffalo. The larvae moult and fall off, to climb onto a new host. The nymph will moult again, fall off and the adult will climb onto a new host. The protozoan parasite will die off when the adult tick dies, and can therefore not be transmitted to the eggs by trans-ovarial passage and infect the new generation of larvae. Two years after infected buffalo have been removed from the veld, the ticks can be regarded as free from corridor disease.

The brown ear tick is known as a three-host tick because it feeds on three different hosts, that may be three different types of animals, during its life cycle. Adults occur during the rainy period from December to March in South Africa, and the larvae from late summer into the cool period following the rains from March to July. The nymphs occur in the winter and early spring from June to October. These ticks prefer to attach to the ears of animals. The optimum control of these ticks is in the summer months, and the aim should be to prevent the adult ticks from laying eggs.

Dipping with an acaricide must be done on a weekly basis.

The clinical signs of corridor disease in cattle appear after an incubation period of nine to 20 days (mean: 12.0 days). Clinical signs are an increased body temperature, swelling of the lymph nodes, fever, listlessness, swelling of the eyelids, a nasal discharge, diarrhoea and emaciation.

A diagnosis of corridor disease can be made by looking for the parasite in smears of the lymph nodes, by using PCR technology to demonstrate the presence of the DNA of the parasite in the blood.

The disease can be prevented by;

- Controlling ticks by dipping cattle on a weekly basis.
- limiting the contact between buffalo and cattle

Chemotherapy is not allowed in South Africa. The chemical does not kill the parasite in the bloodstream. This inhibiting effect on the parasite will lead to a carrier state of cattle.