

Rabies in kudu and eland #1: Implications to the game industry



Introduction

In spite of rabies being a well-known and much researched disease, many uncertainties exist around the peculiar, seemingly Namibia specific, manifestation of rabies which decimates our Kudu and Eland populations country wide. In this article we dive deeper into rabies, and especially what implications it can have to game farmers. This article is the first in a series of three, about rabies, herd immunity and how vaccinations work.

Background

Rabies, a fatal viral disease known since ancient times, attacks the central nervous system (brain and spinal cord) of **all mammals**, including man. This disease occurs sporadically, throughout most parts of the world but is endemic (occurs commonly and widespread) to Namibia, with a high prevalence in the central and northern regions. In recent years the disease also occurred in the southern and eastern parts of the country (Figure 1).

Rabies is known as a disease with a low morbidity (affecting few animals in a population) but high mortality (100% amongst infected animals). The Namibian rabies situation is unique in that the disease spreads from Kudu to Kudu (and Eland to Eland) and reaches epidemic proportions with devastating effects in these species.

Is this really rabies or is this some 'kudu pest'?

Amongst farmers there is some confusion regarding the cause of death amongst Kudus, with many talking of the "Kudu pest". The Central Veterinary Laboratory in Windhoek has examined the brains of many affected animals with a rabies specific test (Immuno-fluorescent Antibody test) and found a great number testing positive, thus leaving no doubt that this is an outbreak of rabies. Outbreaks occurred sporadically since 1977-85, causing severe mortality amongst the country's Kudu population. I personally observed how, in 2005, this disease within three months decimated the once abundant Kudu population on our farm near Windhoek to a mere fraction of its original number.

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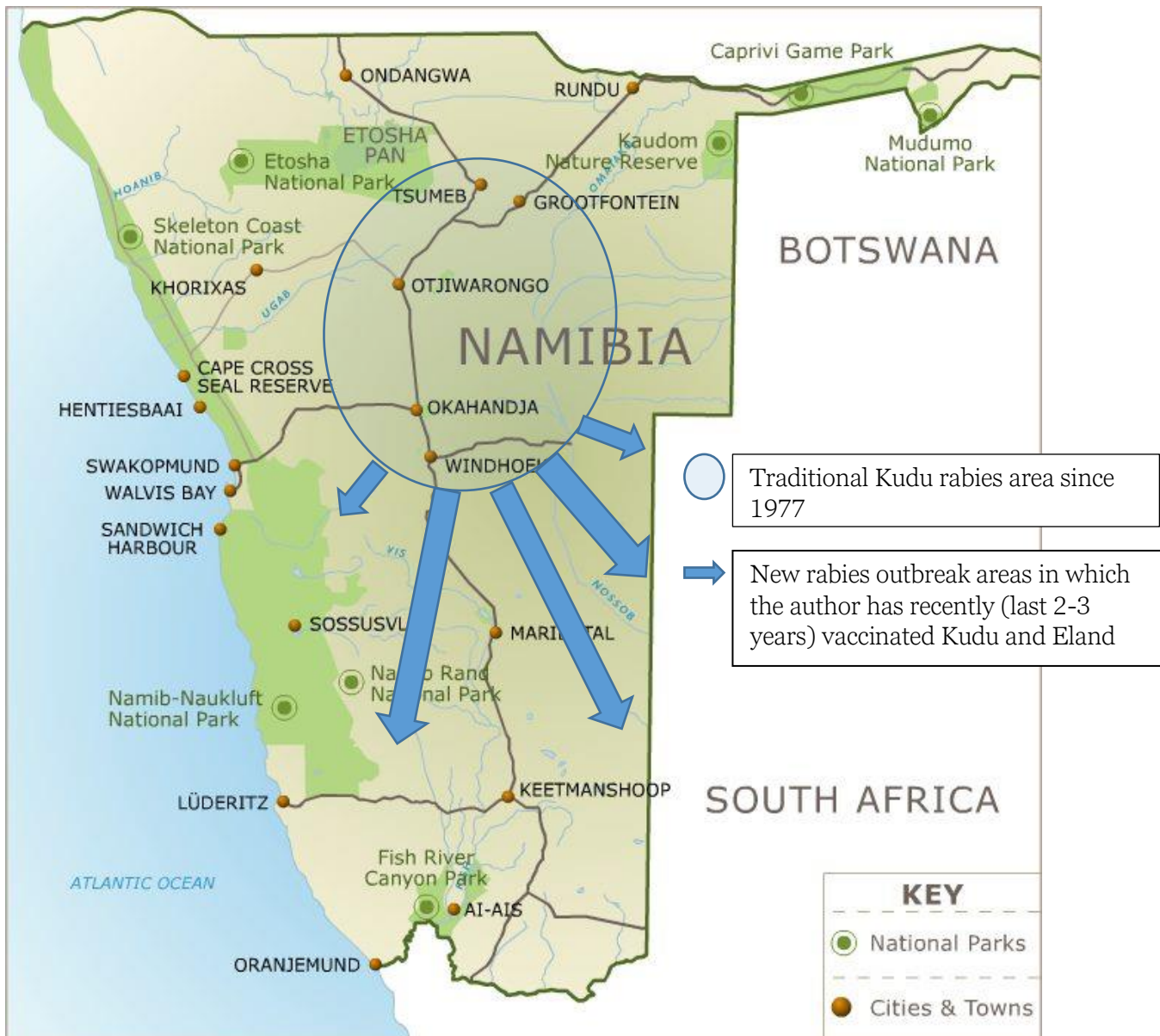





Figure 1 Map of Namibia indicating the spread of rabies. Map adapted by U. Tubbesing


Disease transmission

Typically, a rabies infection starts with an animal being bitten by an infected animal (Jackal, yellow Mongoose, dog etc.). The bite wound is contaminated with virus particles contained in the attacker's saliva. The virus then migrates up the nerves towards the spinal cord and eventually the brain, where it preferentially infects and multiplies in certain areas, resulting in rather predictable symptoms (see below). From the brain the virus migrates down the nerve tracts to the salivary glands, where another phase of rapid viral replication occurs, resulting in a very high concentration of virus being excreted in the saliva, rendering this animal infectious to others.

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Infected animals will excrete the virus in their saliva from a few days before the onset of symptoms up until death. As a general rule it can be said that the closer an infectious bite is to the head of an animal, and the more severe the bite wound(s) inflicted, the quicker and greater is the likelihood of the bitten animal (or man) succumbing to the infection. It may take up to one year from being bitten by a rabid animal before a patient may show clinical signs and die!

Even though some animal species play a more important role in the transmission of rabies (Jackal, yellow Mongoose, dog etc.) no known carrier state (i.e. animal species that can harbour and spread the virus without eventually dying from the disease) has yet been identified. This means that all infected animals will die within about 10 days from the onset of symptoms.



Figure 2 Kudus are social browsers

Amongst wild herbivores, Kudus appear to be most susceptible to rabies, likely followed by Eland. Within a Kudu population, rabies most probably starts with a Kudu being bitten by a rabid animal, however, the further spread of this disease is associated with the species susceptibility to the disease, its social behaviour, where communal grooming as well as group feeding from the same bush or tree are very common (Figure 2).

The habit of browsing on thorn bushes will obviously result in many small wounds to be found in a Kudu's mouth. These are ideal portals for infection which are very close to both brain and salivary glands, it appears logical that both the course of disease (infection to time of

symptoms and death) and the spread of rabies within a Kudu population are far quicker and more dramatic than in most other species.

The initial disease outbreak is insidious in onset and may go unnoticed for a few weeks. Once the number of infected animals in an area increases the disease spread accelerates dramatically, until a large proportion to the population is affected and dies. In recent years frequent and devastating outbreaks of rabies occurred in both Kudu and Eland populations in Namibia. To the best of my knowledge no other wild browser/grazer species have yet been affected to any significant degree.

Spread of infectious disease is easier and faster where susceptible animals are in close proximity to each other. The risk and incidence of rabies is thus increased in places and times where animals are concentrated in specific areas, e.g. large kudu population (as well as other species) converging around water sources in the dry (winter) seasons. It also explains why gregarious animals are so severely affected.

Sceptics often ask "If all these Kudus are dying from rabies why don't we see many rabies cases amongst our predators?" A rabid Kudu is not likely to chase after, nor able to bite a predator to transmit the disease. Further, because the virus is very labile (loses infectivity shortly after the host dies) the risk of transmission from dead Kudu to scavenger or predator is rather remote. Most of the carnivores remaining on commercial farmland tend to occur as solitary animals or in small groups, making them less susceptible to an "outbreak" of rabies. However, cases have been reported where in nature reserves entire groups of social carnivores like wild dogs, bat eared foxes, lions etc. have been wiped out by the disease.

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Symptoms in animals infected with rabies

One of the first signs of this disease is unusual behaviour displayed by the animal. Domestic animals often seem to “become wild”, showing unexplained aggression whereas wild animals “become tame”, literally straying into towns, gardens and homes, thus increasing the risk of exposure to domestic animals and man (Figure 3).

Any animal showing abnormal behaviour, especially if associated with other nervous signs (staggering, hindquarter paralysis, restless, drooling saliva or having difficulty swallowing, biting at objects – real or imaginary, changed tone of voice with abnormal and continuous howling or bellowing) should be suspected of having rabies. Cat species as well as the honey badger tend to become extremely aggressive and vicious, resulting in severe unprovoked attacks on humans.

Infected animals lose the ability to swallow, which results in the excessive salivation (drooling) commonly noted. They rapidly loose condition due to dehydration and starvation and are then frequently found in close proximity to water (Figure 4), where they repeatedly make failed attempts at drinking, often make bellowing noises and eventually die an agonizing death.



Figure 3 “Tame” Kudu cow in close proximity to human settlement and seemingly oblivious to the presence of dog or man. The Kudu displays a high stepping and staggering gait. © U. Tubbesing



Figure 4 This kudu bull near a dam most likely succumbed to rabies © U. Tubbesing

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NOTE!! Excessive drooling and foaming at the mouth, the so-called classic symptoms of rabies, are only displayed late in the disease and are not always present. These are also typical signs of animals having a foreign object (e.g. a bone) stuck in the mouth or gullet. Symptoms of rabies are frequently suggestive but never 100% diagnostic!! Starvation during a drought is a common reason for Kudus to penetrate into urban areas, especially at night, in search of food and water. This may easily be confused with rabies.

Farmers often report a disproportionately high mortality rate amongst mature Kudu bulls. In my experience the disease affects both bull and cow-calf herds equally, usually rapidly spreading and “wiping out” the entire affected group. However, mortalities in bulls are easier detected (e.g. a set of horns sticking out over grass level will be noticed on a game drive whereas a dead cow or calf would not be detected in high grass).

Actions to minimise the effect of rabies on kudus/eland and our bottom line

From a trophy hunting perspective, the Kudu bull is both one of the most wanted and slowest maturing (i.e. reaching trophy standards only after 8 + years) antelope. The decimation of the Kudu population due to rabies, especially on game fenced farms, poses a severe and long-term threat to the farmer’s income. Following the ecological route of letting nature run its course is not the wisest financial option available.

Vaccination of Kudus against rabies appears a logical option and is feasible in game fenced areas. Oral vaccinations (putting out bait containing an oral rabies vaccine) were successfully performed on foxes in Europe, but are not feasible in Namibia. The bait and vaccine needs to be kept cold, something easily achieved in the European winter but not in Namibia. Research is currently being conducted to find a workable Namibian solution but, thus far no practical and effective solution has been found for oral vaccination.

Capture, vaccinate and release programs were conducted in Canada (fox, skunk & raccoon) as well as in Arizona (skunk) and proved to be effective in curbing the spread of rabies. Herding Kudus and Eland into a capture boma where they can be vaccinated and temporarily marked (water soluble paint blotch on the rump) to avoid the same animals being herded, captured and vaccinated twice is possible.

A much quicker and cheaper alternative is to literally dart vaccinate the animals from a helicopter (Figure 5). Over the past few years we have done this repeatedly on a number of game farms both during and following an outbreak. In all cases the farmers reported the outbreak stopped within 10-14 days of vaccination. Those farms where we prophylactically vaccinate annually or biannually now support a thriving Kudu population.

Ideally one strives towards obtaining the highest possible percentage vaccine cover in the said Kudu population. Depending on the size of a farm, the Kudu and Eland population density, bush density (season) and the % vaccination cover aimed for, such a vaccination campaign could be executed within a few hours at a cost equivalent to the trophy fee obtained for say 4-6 Kudu bulls shot. Spending this amount of



Figure 5 Kudu bull just darted from the helicopter © U. Tubbesing

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money to protect and ensure a sustained healthy Kudu population on a given farm is definitely an economically feasible exercise.

If the Kudu population on a farm has already been destroyed by the disease, vaccinating the residual population may be a costly exercise. As much helicopter time will be needed to fly and search the remaining few animals as would be needed to do a proper vaccination of the entire herd. Here I suggest that the farmer introduces a sizeable group (ideally double the current population on the farm, thus indirectly achieving a 50% plus vaccine cover) of Kudus sourced from a rabies free area where Kudus were vaccinated prophylactically. However, with the current scarcity of Kudu in Namibia restocking a farm may not be feasible.

Some people suggest that a game fence will substantially reduce the spread of rabies, however, current experience suggests that once an outbreak occurs within a fenced area, the fence may concentrate the effect of that outbreak. Game fences block normal migration routes, thus interfering with repopulation by Kudus from outside the area following a rabies outbreak. This increases the risk of inbreeding within the remaining kudu population should new breeding stock not be introduced.

Rabies outbreaks are usually associated with high Kudu densities. As a result, some advocate the radical thinning out of Kudus to reduce the risk of transmission and to minimize the financial impact on the farm. This approach may work on unfenced cattle farms that are not dependent on an income from the trophy hunt. However, during a culling operation it will be impossible to identify infected animals. Keep in mind that meat from animals that suffered of infectious disease should not be used for human consumption. Handling of a fresh rabies carcass may predispose people to the disease!! It is unethical for farmers and game dealers to knowingly capture and sell Kudus from a farm with an infected Kudu population.

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Important factors to consider with vaccinations

The vaccine used (Rabisin® etc.) was tested in domestic animals and not in wildlife. We thus don't know for how long a vaccinated animal is protected. Since a booster vaccination is, in most cases, unpractical and cost prohibitive, I strongly suggest annual or at least biannual vaccination of all Kudus (and Eland) on high risk properties (Figure 6).

We strive towards obtaining the highest possible vaccine cover (at least 60% of the population) to stop an outbreak and adequately protect a population. It is useless to only vaccinate bulls since the helicopter costs will only be marginally lower whilst this gives an ineffective vaccine cover for the herd. With a high cow/calf mortality rate the farmer will obviously lose out on future bull production.

The vaccine used is a dead vaccine which can't induce disease, nor can it cure already infected animals! It is thus advisable to prophylactically vaccinate animals in winter. Emergency vaccinations during an outbreak will usually stop an outbreak within 10-14 days following vaccination but farmers must expect animals infected before the vaccine could evoke an immune response to still die off for some time following vaccinations.



Figure 6 We use a special rabies vaccine such as Rabisin® or Nobivac® to vaccinate kudu and eland. The darts have a gel collar (red part on the needle), which dissolves with time. The dart then falls out by itself. © M. Bijsterbosch

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Human and pet precautions to be taken

In endemic areas like Namibia it is recommended to vaccinate all animals annually. Prevent pet exposure to rabid animals by securing your property to stop pets from straying.

Inform your children, workers and neighbours about this disease. People should stay away from wild animals and unknown dogs, cats, etc. especially if these display abnormal behaviour. Such animals should, if possible, be examined by a veterinarian or be destroyed (do not shoot them in the head), and the head (wrapped in plastic to avoid virus contamination of the area, clearly marked as “hazardous – possible Rabies” and kept cool but not frozen!) submitted to the Central Veterinary Laboratory in Windhoek for a rabies test. Since the intensity of post rabies exposure treatment is determined by the associated risk to people, this is essential if a person was bitten or had very close contact (e.g. wound contamination with saliva) with such an animal.

People at high risk of exposure, e.g. farmers and their workers, veterinarians, etc. should seriously consider rabies vaccinations for themselves.

What should one do if exposed?

If your animal(s) were in contact with an animal with suspected rabies, consult your veterinarian immediately. At the very least a rabies vaccination (even if your pet is current on its vaccinations) is indicated. If a bite was inflicted by a dog or cat not showing symptoms suggestive of rabies and if the animal (both yours and the one inflicting the bite wounds) received regular rabies vaccinations, infection is highly unlikely.


The virus is very sensitive to soapy detergents. People who were exposed to an animal suspected of suffering from rabies should immediately and thoroughly wash the skin and/or bite wounds with soap and water. This simple measure will drastically reduce the risk of contracting the disease. After this, call your doctor. Preventative treatment is safe and effective IF STARTED EARLY, however, no animal or person has ever survived the disease once symptoms of rabies set in.



The treatment of a person, bitten by a rabid animal is very expensive and is thus usually reserved for patients with confirmed rabies exposure.


Conclusion

Rabies can have a devastating effect under kudu and eland populations. As a game farmer it is worth protecting your populations by vaccinating on an -at least- biannual rate. In the following articles: Rabies in kudu and eland #2: Herd immunity in rabies and COVID-19 & Rabies in kudu and eland #3: How vaccination leads to immunity, we tell more about herd immunity and further explain why vaccinating is so important. Click [here](#) to read and download these articles.

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