Wildlife Vets Namibia August 2020 Edition 29

NEWSLETTER AUGUST

In this newsletter:

Dear clients,

In this newsletter you can read more about animals and camouflage; several species use different types of camouflage. We also discuss our latest article we wrote about rabies in kudu and eland. In this article we discuss a few concepts which you hear all the time when people talk about COVID-19. We hope you enjoy this newsletter, and if you want us to write about a certain topic, don't hesitate to give your suggestions 😊

Kind regards, Ulf and Mariska

MASTERS OF DISGUISE ~ ANIMALS AND CAMOUFLAGE

In these times of uncertainties and changes we sometimes just want to hide from the world... unfortunately, natural camouflage is not really one of humans' major skill sets, unlike some animals! The camouflage 'tactic' that an animal uses depends on a few factors. The first one is physical characteristics; animals with a fur use different tactics than animals with feathers or scales, as they can shed and change colours quicker. Furry animals may change only twice a year as the season changes, think of the artic fox who is white in winter, but grey/brown in summer. Animals that live in groups also have different tactics than solitary animals, think for example of the confusing effect zebras have on predators when they are in a group. It also depends on the physical traits of the animal's predator; when the predator is colour-blind, the prey does not have to blend in with its environment. An example is the colour-blind lion, who's main prey are zebras. The zebra therefore does not need to blend into the savanna environment.

There are a few basic types of camouflage animals use, which are mainly for defense purposes, or to avoid detection (predators). The word camouflage is derived from the French word *'camoufler'*, which means 'to disguise'.

Concealing colouration or background matching

This is the most common form of camouflage, whereby the body colour of the animal is more or less the same as the environmental substrate (soil, grass etc.) where it lives.

Examples: roans and lions that blend in with the grasslands.

Disguise

When the animal physically (its shape) looks like something non-living from its environment, as well as being the same colour.

Examples: stick insect, grass-hopper that looks like a stone.

Disruptive colouration

Many species use spots, stripes or other patterns on the coat to 'break up' their body outline. These patterns form false edges which disguises the shape of the body. Because most mammals only have black-and-white vision, they rely on movement and shape. When the shape is broken up, this can be an effective tactic.
Examples: cheetah, tiger, zebra, kudu.

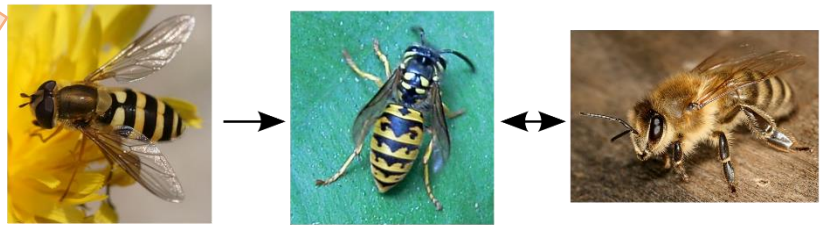
Counter-shading

The back and belly have different colours, which are used to conceal the animal when viewed from above or below. There are usually darker on top, and lighter at the bottom.
Examples: sharks, whales, penguins.

Mimicry

This is when the animal physically looks like another animal (colour or/and body form). There are 2 forms of mimicry:
- Batesian mimicry: a non-dangerous species mimics a dangerous/venomous species. Examples: Monarch butterfly, some snake species (e.g. harmless scarlet king snake vs. deadly coral snake in the USA)
- Müllerian mimicry: 2 unrelated well-defended (foul-tasting/venomous/poisonous) species mimic each other to strengthen their danger message towards predators. Examples: *Acraea* butterfly (Reds), bees, wasps

*The difference between venomous and poisonous? **Venomous animals** are the ones that inject a toxin into their victim (be it predator or prey), using fangs, stingers, or other weapons. Examples are snakes, spiders, scorpions. **Poisonous animals** administer toxins through touch, absorption or ingestion. Examples are frogs, toads, butterflies.*



The above-mentioned types of mimicry can also be versions of **'Aposematic' mimicry**. The word aposematic comes from the Greek language; meaning *apo* – away, *semantic* – warning. So, aposematism is a defence strategy of animals whereby they use bright colours to show predators that they are foul-tasting, venomous or poisonous. To be seen = to be avoided! Although this strategy is the opposite of camouflage, the result is the same.

Diurnal (day-time) animals that use aposematic mimicry usually have bright colours, such as black with red, orange or yellow. These contrasting colours are extra noticeable. Nocturnal (night-time) animals usually have black with white colouration.

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RABIES DARTING

Rabies is a fatal viral disease, which attacks the central nervous system (brain and spinal cord) of all mammals, including man.

This disease 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. 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. If you want to know more about rabies in kudu and eland, have a look at our article Rabies in kudu and eland: Implications to the game industry.

Over the past few years we have been vaccinating kudus and eland against rabies 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. Seeing the kudu prices of +/- 8000N$ for kudu cows, and 18.000N$ for a 47" kudu bull on the last game auction, it is well worth your money to protect them against rabies.

The best time to vaccinate is before the bushes and trees start flowering. We dart the animals with drop-out darts from the helicopter, which is the quickest, cheapest and most effective way of vaccinating most animals on the farm. When multiple neighbouring farms join in on such a vaccination campaign, it not only means that the total kudu/eland population is better protected, it also saves lots of kilometre- and helicopter ferry costs! So, if you are interested in vaccinating your kudu/eland population, see if neighbours want to join in, and gives us a call!

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In our latest online article, we compared rabies to COVID-19. Below is a summary of the article, the entire article you can find here. The COVID-19 pandemic has a profound effect on all of us. Not a day goes past without people discussing concepts like infection rates, immunity, vaccination, herd immunity, social distancing etc. Since winter (after the leaves have dropped from trees) is also the optimal time of the year to vaccinate kudus and eland against rabies. It is a good time to discuss some of the above concepts and explain the similarities and vast differences between rabies transmission and prevention in our wildlife population compared to COVID-19 management in people.

Herd immunity

When there is a major disease outbreak (epi- or pandemic), the end result is usually as follows:

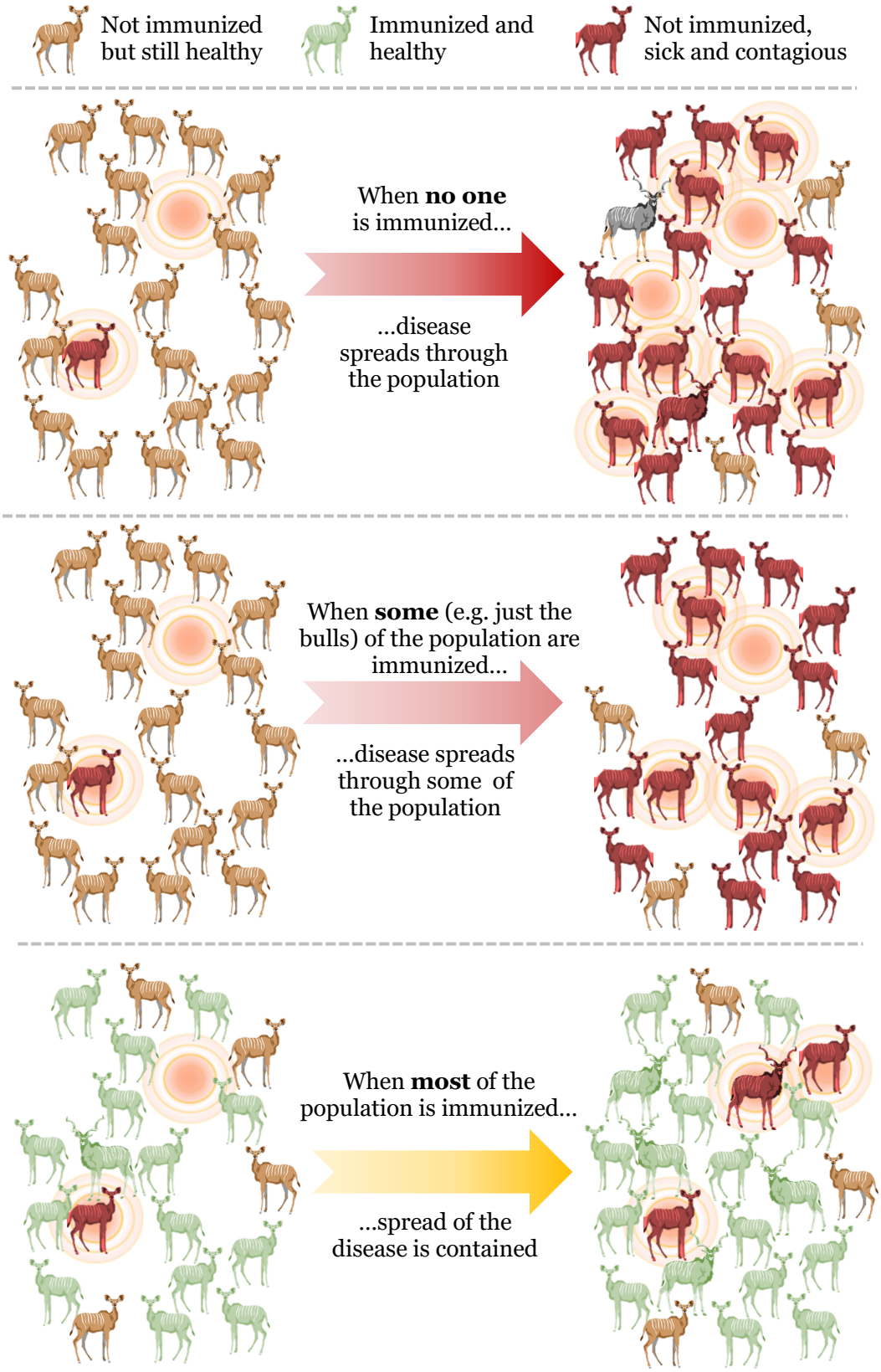
- Cases are tracked and isolated (in animal populations culling rather than isolation is applied), or
- A population achieves herd immunity, often with the help of a vaccine.

In herd (population) immunity members of a population benefit of indirect protection from an infectious disease (usually a virus) after a large percentage of that population has become immune to that disease.

Immunity can be achieved either by vaccinating people/animals against that disease (e.g. rabies or COVID-19) or, after a patient has been exposed to, and recovered from an infection and is now immune against that disease. The greater the percentage of immune individuals in a population, the more effective the physical shield they "build" around non-immune individuals will be, thus achieving the state of herd immunity. This will slow and eventually stop the spread of infection.

The level of population immunity needed to achieve herd immunity largely depends on the virus involved (infectivity, mortality rate etc.), the population (population density, susceptibility etc.) and on the nature of immunity achieved, but a figure between 60-90% is generally quoted.

Individuals can become immune by recovering from an infection or through vaccination. However, not all individuals within a population will pick up immunity (e.g. sick and/or too young to be vaccinated and in wildlife, some animals will not be spotted and thus "skip" being vaccinated). Herd immunity is essential to protect this group of individuals. Once a certain threshold (minimum 60- 70% of the population immune) has been reached, a disease will gradually be eliminated from a population. The figure on the next page shows the concept of herd immunity.



1 shows a disease outbreak in a population. Just a few animals are infected (red), and the rest are healthy but not immunized (normal colours). The disease will then spread freely through the entire population.

2 When a few animals are vaccinated (immunized, shown in green), a disease can still spread quickly to unvaccinated animals.

3 When most animals in the population are vaccinated, they limit the effectiveness of a disease. In other words, the disease is prevented from spreading throughout the entire population. The ability of immunized animals (or people) to protect others is what we call 'herd immunity'.

In the first 2 examples, most kudus get rabies from the 2 infected kudus. In third example, only 1 additional kudu suffers from rabies. Most of the others are immune, and others are protected as they don't come into close contact with the infected animals.

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Rabies compared to COVID-19

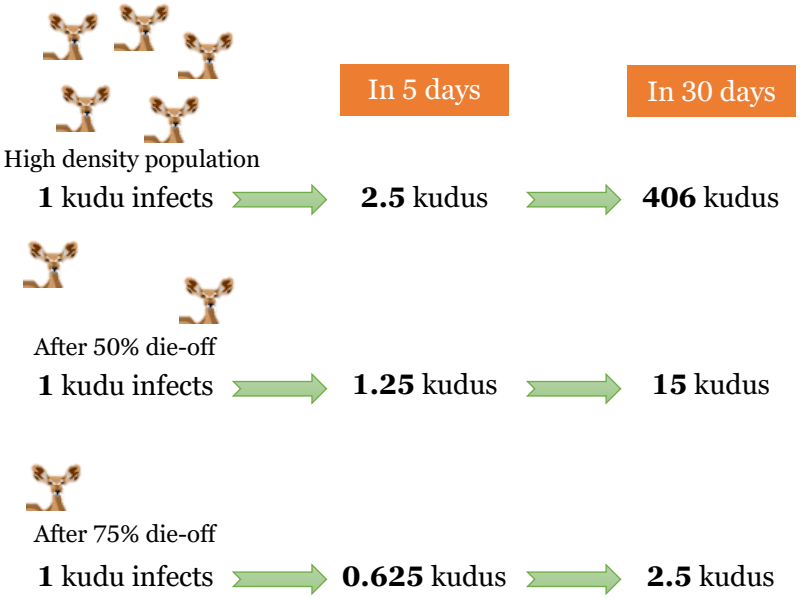
In *Table 1* the main differentiating features between rabies and COVID-19 are listed.

Table 1 Basic features of rabies compared to COVID-19

Disease characteristics	Rabies	COVID-19
Virus?	Yes	Yes
Infectivity	High but needs very close direct contact	Very high and can be transmitted indirectly (surface contamination)
Mortality rate	Nearly 100% of the infected	Less than 1% of infected
Vaccine availability	Yes, very good vaccine	None yet
Does immunity develop After natural infection? After vaccination?	 Few survivors, suspect good immunity Very good & long lasting	 Unknown, maybe not long lasting Unknown, maybe not long lasting
Herd immunity achieved at	60-70% population immunity	90%+ population immunity
Herd immunity possible through Natural infection? Vaccination?	 Not feasible, high mortality % Yes, very good	 After 90% of population infected ?? Time will tell…
Does "social distancing" help?	Yes, disease stops at low population density	Yes, vitally important management tool

Compared to COVID-19, with rabies we have the huge benefit of a safe and highly efficient vaccine that provides man and animal with relatively long lasting immunity. Since the average antelope herd grows by 25-30% annually, it is advisable to vaccinate a farm's kudu and/or rabies population at least every 2 years.

Needless to say, a disease outbreak can be totally prevented by prophylactic (preventative) vaccination (if a vaccine is available). In the absence of an effective vaccine the disease will spread unchecked until herd immunity is reached and/or the population has been decimated to such an extent that a "social distancing" effect comes into play (see figure on the right). Delaying vaccination until an actual disease outbreak occurs will only be partially effective since a certain percentage of the population would have already died and more animals would be sick and spreading the disease in the 7-21 days it takes before an animal develops proper immunity following vaccination.



Indirect 'social distancing' effect coming into play once a disease has diminished the herd numbers on a farm © U. Tubbesing

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Read and download the entire article '[Rabies in kudu and eland #2: Herd immunity in rabies and COVID-19]' on our website. Considering the importance of kudus and eland as a game ranch species in Namibia, we believe that herd vaccination against rabies is the only realistic way in which herd immunity against this potentially devastating disease can be reached. In a following article in this series we explain how immunity works and why it is important to do follow-up vaccinations both against rabies as well as other important diseases.

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