Wildlife Vets Namibia October 2023 Edition 67

NEWSLETTER OCTOBER

In this newsletter:

Dear clients,

This newsletter is a bit longer than usual, but we have some interesting topics to share with you! First off, you can read about the differences between antelopes and gazelles. Furthermore, we have been involved in a very exciting project from the Max Planck Institute, where we have assisted in the tagging of numerous species with special light-weight solar panel ear tags. Lastly, we give a summary of our latest article; tannin toxicity in herbivores in Namibia. We hope you enjoy the newsletter!

Kind regards, the Wildlife Vets Namibia team.

ANTELOPE OR GAZELLE?

In the main stream media antelopes and gazelles are often mixed with each other. There are similarities, for example they all have cloven hooves and most have horns. Both antelopes and gazelles belong to the Bovidae family (antelopes, buffalo, cattle, goats, sheep and bison). All gazelles are antelopes, but not all antelopes are gazelles... Do you still follow?

Grant gazelle ewe. Photo taken in the Ngorongoro Conservation Area in northern Tanzania © M. Bijsterbosch

Gazelles are basically a subclass of antelope. Of the 91 antelope species, there are about 17 different types of gazelles. The taxonomy of the different gazelle genera (*Gazella*, *Eudorcas*, *Nanger*) is confusing and there is a lot of debate which subspecies belongs where. The word gazelle comes from the French *gazelle*, which probably came into the French language via the north African Arabs: غزال ġazāl. In many countries of the northwestern Sub-Saharan Africa, the gazelle is commonly referred to as "*dangelo*", meaning 'swift deer'.

There are several differences between the two. Firstly, in general gazelles are smaller than other antelopes. For example, the biggest gazelle is the Dama gazelle from the Sahara, who is max 75 kg, while the eland antelope can weigh up to 900 kg! In gazelles, both sexes have horns. This is the reason for example that an impala is an antelope and not a gazelle; rams have horns, ewes don't. The horns of gazelles are ringed, and have hollow cavities within the horn bone.

Most gazelles have an athletic body, are slender build and are very fast. They also have contrasting makings on the side of the body. The antelope which resembles a gazelle probably the closest is the springbuck.

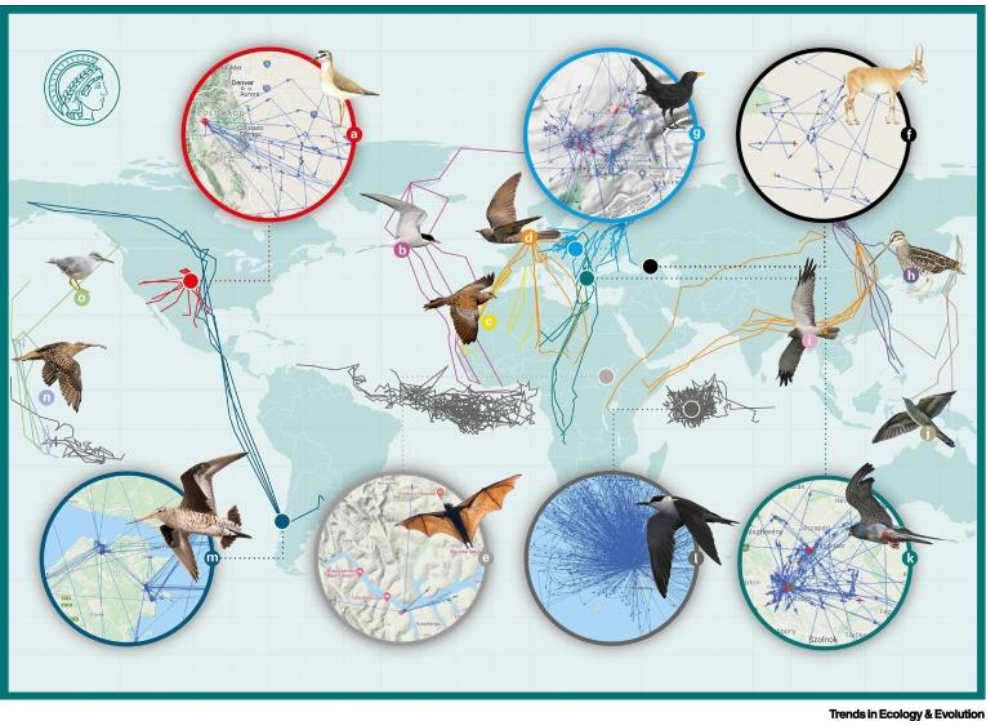
To see gazelles in Africa (there are also species in Asia and America), you would have to travel a bit more north or north-easteast, to for example Tanzania, Kenya, Sudan, the Sahel or the Sahara.

Left; springbuck ram in Etosha NP, Namibia. Right; Thompson gazelle ram in the Ngorongoro Crater, Tanzania. © M. Bijsterbosch

THE ICARUS INITIATIVE

We have on a few occasions, been involved in a very interesting research project, called the ICARUS Initiative. ICARUS is short for 'International Cooperation for Animal Research Using Space'. This project is led by Martin Wikelski and Uschi Müller from the Max Planck Institute of Animal Behaviour. Before we delve deeper into the Namibian project, first some information about the project itself!

Tracking animals is not a new thing, but the ICARUS Initiative is taking animal tracking to the next level. The goal of ICARUS is to create a living map of the Earth's animals – this means tracking animals with a network of sensors (tags on the animals) that can send real-time data to space. Basically, an 'Internet of Animals' is created, that can tell researchers how ecosystems are changing real-time, and how animals respond to this.



This picture shows animal movement data which was captured between 11 March to 03 November 2021 © Trends in Ecology & Evolution

Understanding animal movements is important to understand a wide range of ecological process, like species' adaptations to habitat loss. where do they thrive and where not? For example, a popular belief is that bats spread Ebola, however, we don't even know where they go! With this technology, bats can be tagged, and important information on disease transmission can be obtained. Some of the specialised tags are so small, that researchers can monitor insects and butterflies, leading to the realisation that they fly much further than we could ever imagine!

The tags, custom-built for each species, are extremely small and light-weight (some weigh less than 5 gr!), yet they can record the animal's GPS position and movement, as well as things like temperature, humidity, pressure, acceleration and magnetic fields. The battery of the tag is recharged by a little solar panel on top of the tag. Most tags have a two-way communication system, which means they can be programmed remotely. The data size that is send out to a satellite is extremely small, and stored in a specially designed Movebank. Have a look at this short video about the ICARUS Initiative.

Animals giving info on impacts on them by climate change

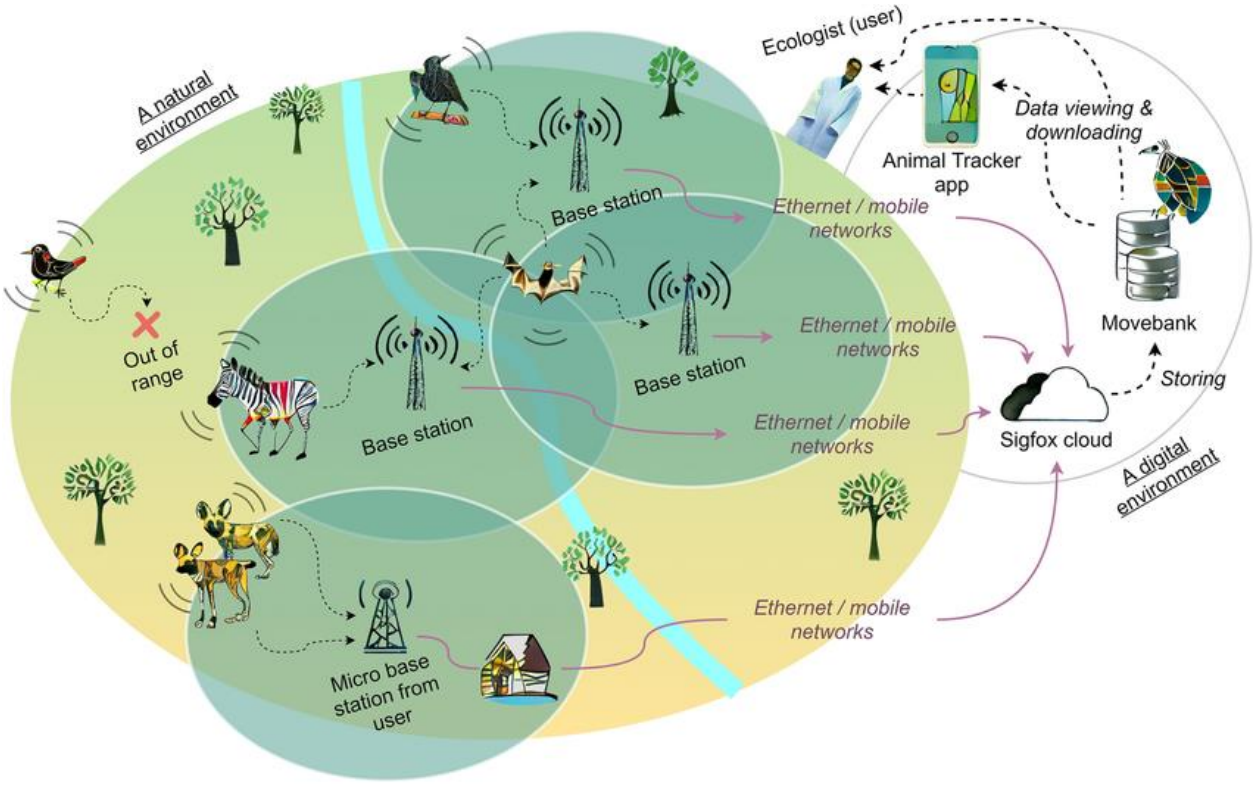
Researchers are evaluating tagged animals to determine the impact of climate change on animals. Tagged elephant seals provide researchers with information on ice depth and ocean salinity in Antarctica. Sea grass captures carbon emissions, while tiger sharks love sea grass and mangroves. Movements of tagged tiger sharks lead the researchers to areas with high concentrations of sea grass. Tagged carrier pigeons can help identify dangerous urban heat islands and air pollution. Read more.

Animals as an early warning system for disasters

Animals tend to notice upcoming disasters much earlier than humans. Data from tagged goats near Mount Etna, Italy, shows that the goats showed unusual behaviour 6 hours before the volcano erupted on 04-01-2012. This knowledge could safe human lives! Read more.

The Namibian Project

In Namibia several species – from elephants, rhinos, zebras and all kinds of antelope - were tagged on two different farms. The aim of this project is to check how these tiny GPS solar-powered ear tags work on the different (larger) wildlife species, but also to see how these animals use their habitat and how they react on disturbances, like for example poachers coming in. These tags don't transmit their data directly to satellites, but to so-called SigFox towers. SigFox is a Low Power Wide Area Network (LPWAN). It consists of a global network of base stations that has, however, a lot of reception holes outside of populated areas. To cover these 'black spots', additional receivers can be put up in coordination with the SigFox provider in a country. The ear tags contain tiny transmitters that transmit data to these Sigfox base stations (e.g., a tower). From the towers, the data is transmitted to the Movebank, from which researchers/farmers can access the data. When an animal is not in reach of a tower, the data gets stored, and is send once the animal is in reach again.



Here you can see a picture showing a SigFox network that tracks animals. The tags on the animals transmit tiny messages to the base stations (SigFox towers). From the towers, the data is sent to the Movebank, from where the data can get accessed by the researcher/farmer. © Wild et al (2023) Animal Biotelemetry

These special ear tags have a couple of great advantages. In contrast to the LoRa system (similar technology to SigFox), the SigFox signal reaches much further, which means a farmer needs fewer towers on a farm.

The data transmitted by the ear tags is packed in a tiny 'message', which is relayed to these SigFox base stations rather than to satellites in space, using very little battery power. This enabled researchers to make the ear tags super small and light-weight – they weigh only 18 grams!

Rhino with a solar-powered ear tag. Tags were placed both on the inside and outside of the ear to see what works best. On the inside, the tags are better prevented to be damaged from the bushes and thorns, but also from mud. Even on the inside of the ear the solar panel gets enough light to work. If a solar panel does get covered in mud, the battery lasts for about 3 days, until it needs sunlight again to charge. Those on the outside of the ear get more sun, which means more datapoints. It seems that even on the outside the tags don't get damaged too much so far, and that the outside of the ear is the place of choice. © M. Bijsterbosch

Since these tags are still being tested, animals were fitted with two tags. Here Martin is tagging a big eland bull. © M. Bijsterbosch

Besides knowing where the animals are, the tags have more advantages. Tagged animals might help to detect poachers on a farm. With human interference (e.g. poachers), animals movement and behavior tends to differ from the normal. Detecting these abnormal movement patterns may enable game rangers to prevent or deter poaching.

In addition, the tags detect if an animal has not moved for a certain time (+/-30 seconds). Even sleeping animals move all the time. The tag then sends out a "mortality signal" alarm to alert the farmer and/or anti-poaching team to check on the animal. In the case of say a poached rhino, this could enable the first responder to apprehend the poachers while busy taking the horns off!

Technology is great, but how can we make sure that the data does not get into wrong hands? The messages that are send to the Sigfox tower, as well as the message that gets send to the Movebank are both encrypted, and only people with an access-link can see the data.

Hopefully, the tags produced by the Max Planck Institute should be available on a larger scale within the 2nd half of 2024 for general use at production costs. Should you be interested in these tags, you are welcome to contact us for more information.

Tagging a black wildebeest, springbuck and elephant © M. Bijsterbosch

TANNIN TOXICITY IN HERBIVORES IN NAMIBIA

In our latest article you can read more about tannin toxicity. This is a complex topic, but it is important that farmers understand that tannins can pose real problems to animals in certain situations. In the article we explain what tannins are, how they affect an animal, how animals defend themselves against tannins, when animals are at greatest risk and how you can minimise the risk of tannin toxicity. We also give example cases of kudus and giraffes. You can find the full article here, below you can find a summary.

Plants have multiple ways of defending themselves against herbivores (plant-eating animals), some have thorns, some grasses are very rough and other plants use chemicals. One of those chemicals are tannins. Tannins are a group of astringent (dry, slightly bitter taste) plant molecules, who are common in fruit, leguminous plants (members of the pea family), pod-bearing trees and shrubs (esp. *Acacia* and *Sesbania* species) as well as in some grass species (sorghum, corn). If you eat unripe pears or plums, or drink very strong tea for example, you can 'taste and feel' the tannins – it tastes bitter and you get a dry, crusty sensation in the mouth. Tannins are found in wood, bark, fruit, fruit pods, leaves and roots of a plant.

Plants produce tannins to defend themselves against over-utilization. Under normal circumstances, animals will usually browse leaves from a tree or bush for a few minutes, and then move onto the next, and then the next. With plenty of browse available, they cause only minimal "damage" to individual plants. Under feeding stress, when there aren't enough trees and bushes to go around, animals are forced to over-browse from the same tree. This activates the trees' defence mechanism and increases tannin production. Browsers are thus very susceptible to changes in their environment:

- In areas of excessive debushing
- Too many browsers in a contained environment (small farm or breeding camp)
- Drought and fire damage

In the below table you can see response of tannin increase in three tree species after being browsed (in an experimental setting). Tannin levels were elevated for 100 hours, before they declined again.

Species	% Rise in tannin after 15 min	% Rise in tannin after 60 min
Peltophorum africanum (Weeping wattle)	44	256
Rhus leptodictya (Mountain karee)	76	275
Acacia caffra (Hook thorn)	94	282

There are two ways in which tannins can have a negative effect on animals:

1) True tannin toxicity. Some plants or trees release toxic substances which can lead to liver toxicity and death of the rumen organisms. Examples are oak (*Quercus* spp.) and several tropical tree legumes (e.g., *Terminalia oblongata* and *Clidema hirta*). Ingestion may result in toxicity and mortality. Since these plants do not occur in Namibia, true tannin toxicity is very unlikely here.
2) Digestive inhibition. Tannins can negatively affect the food intake of an animal, as it reduces the palatability (being tasty) and it reduces the digestibility of the food. Tannins will interfere with the digestion by creating non- or poorly digestible complexes with certain nutrients (e.g., proteins, starch, cellulose, minerals). Animals cannot properly digest these nutrients, which are lost via the faeces. This undigested food accumulates in the rumen/stomach, thereby suppressing the animals' appetite – animals starve while having a full belly.

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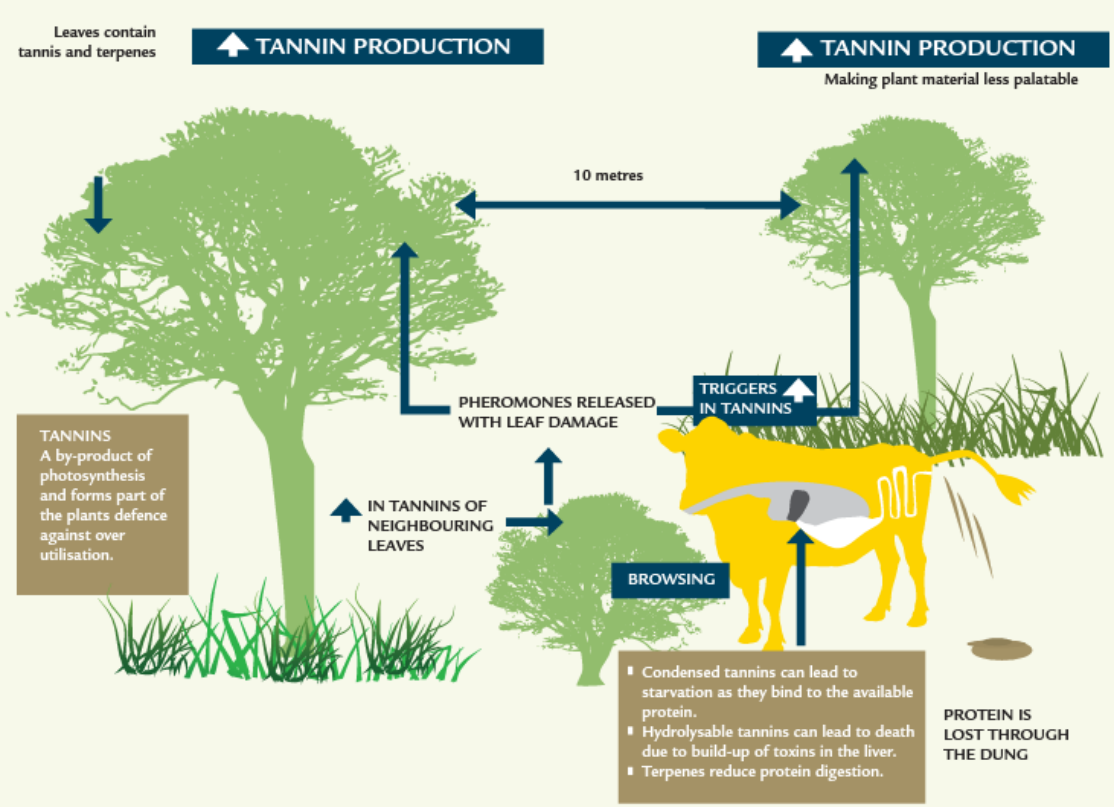

Tannins are a natural by-product of plants to defend themselves against over grazing/browsing. Tannins cause the plant material to taste unpleasant – animals will move further on to forage. When there is not enough food, animals are forced to eat tannin-rich plants. Tannins will then interfere with the animal's digestion – the animal cannot properly digest proteins anymore, which are lost via the faeces. Animals starve while having a 'full' belly. © Virbac

On quite a few farms we visited in September/October 2023 we noticed that the kudus are in very poor condition in spite of seemingly having a full belly. These kudus are spending much of their time feeding from trees and bushes with a very clearly visible browse line. This picture is especially common on farms with a high kudu density in combination with many impalas and springbuck competing for the same food.

The browse line gives a very clear indication of over-browsing which will result in increased tannin secretion, reduced food digestibility and animals literally starving with a "full belly" as is demonstrated by the kudu photo below. Another example are giraffes, whereby especially the youngsters die of starvation due to the browse line. You can read more on this topic in our January 2022 newsletter.

A Vachellia (Acacia) bush where you can clearly see the browse line. On the second photo you can see a thin kudu cow, with a 'full' belly. © M. Bijsterbosch

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As a farmer, there are a few things you can do to minimize the risk of tannin toxicity amongst your animals:

- Avoid overgrazing, and especially over-browsing, by keeping animal numbers within the species-specific stocking capacity of a camp or farm. A heavily de-bushed camp should not be stocked with kudu and giraffe!
- Avoid small breeding camps for browsers. In one study it was estimated that a single kudu needs around 1500 bushes of browsing height to survive. Needless to say, it will be rather difficult to keep 20 or more kudus in a 100-ha breeding camp.
- Provide Polyethylene Glycol, better known as "Browse Plus" from Virbac in drinking water, or as feed/lick additive. Clinical trials as well as field experience by many farmers who have used this product for many years provide ample proof of its efficiency. It is critical that this product is NOT a license to overstock! Farmers are ultimately responsible for their management actions and will bear their fruit (good or bad)!
    - Browse Plus is a specialised formula designed as an additive to drinking water, feed or lick. It largely counteracts the effects of tannins and thus enhances the animal's digestive process, resulting in better nutrient utilisation.
    - Follow this link to the Browse Plus Product Leaflet, which gives you more information on how this product works, and how you should use it.

Read and download the full 'Tannin toxicity in herbivores in Namibia' here.

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