Wildlife Vets Namibia November 2022 Edition 56

NEWSLETTER NOVEMBER

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Dear clients,

Its already November, the year is really nearing its end. We hope that the remainder of 2022 will be a great time for you! In this newsletter we explain how animals such as horses and zebras can stand while sleeping, and we explain how the pulse oximeter works. We have seen in several areas that the Slangkop-plant comes up again, this poisonous plant is dangerous for both livestock and game, so we wrote a short article on this plant. Enjoy the newsletter! Kind regards, the Wildlife Vets Namibia team

LOCKING JOINTS

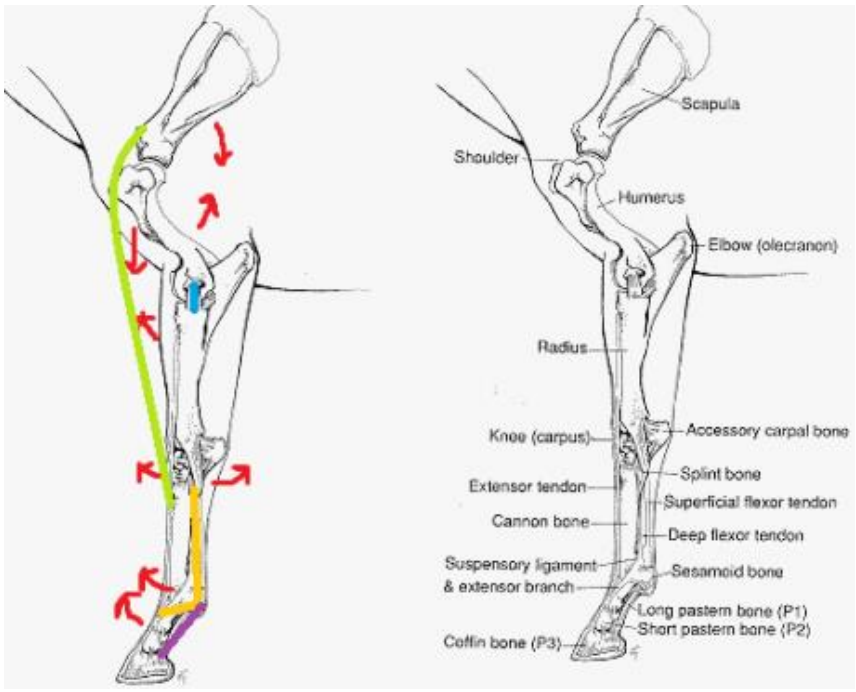
Ever wondered how some animals, such as zebras and horses can sleep while standing up?

Zebras in Etosha NP © M. Bijsterbosch

Zebras, horses and a few other hoofed species have a '*stay apparatus*'. The stay apparatus is a group of ligaments, tendons and muscles which 'lock' major joints in the front- and hind legs. This structure allows them to rest while standing, and it uses very little muscular activity. When the stay apparatus is active, the muscles are bypassed, and connective tissues such as tendons and ligaments take over. This enables the zebra to conserve energy while standing, and being ready to flee should a predator come around the corner.

The stay apparatus is quite a complicated structure, but wat it basically does, is transferring the weight from the thoracic limb (front leg) muscles to connective tissues that do not get tired (tendons and ligaments for example). Zebras and horses have a stay apparatus in the front legs and in the pelvic region. In the front legs the stay apparatus automatically 'switches on' when the animal's muscles relax. Certain ligaments will stabilize the carpus (wrist), fetlock and bones of the foot. In the shoulder and elbow are also tendon-like structures that keep the joints locked in a standing position. In the hind legs certain ligaments 'lock' the patella (knee cap) and prevents flexion (bending) in the stifle (knee) and the hock. At the stifle joint, a hook structure prevents the leg from bending.

For a good deep sleep (REM sleep), the zebra will have to lie down. Luckily for them, they don't need much deep sleep. For more info on how animals sleep, read the January 2022 newsletter!

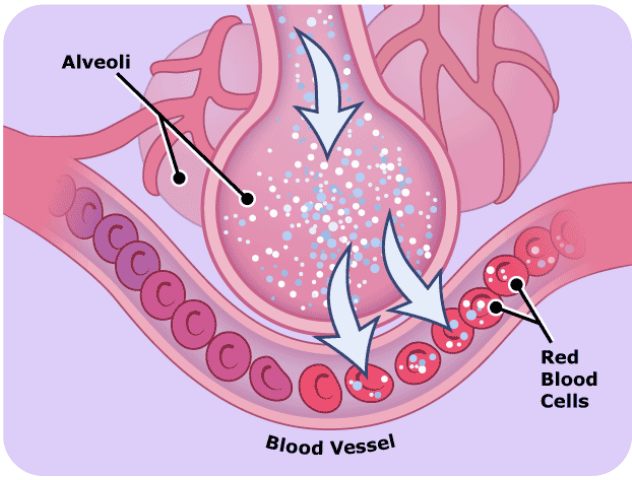


This picture shows the front leg of a horse. The red arrows show which way the joints would collapse due to the body weight of the horse. The coloured lines show all the components of the stay apparatus that prevent collapsing of the joints © Vetplease

PULSE OXIMETER

When an animal (or human for that matter) is going in for a surgery in the clinic, the animal is carefully monitored by several sensors that check e.g. the heart rate, oxygen level, blood pressure, CO_2 etc. In the field it's a bit difficult to carry all those machines and sensors along. We therefore rely on good observations, and our little pulse oximeter. We use the pulse oximeter when we have to do surgery on an animal, and when it needs to be under anaesthesia for a longer period of time.

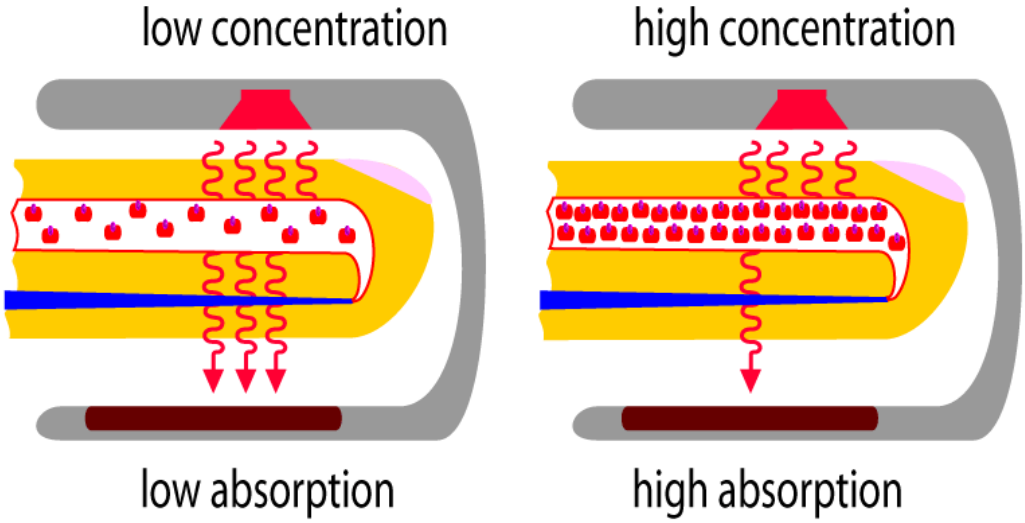
A pulse oximeter, or in short; pulse ox is a device that estimates the amount of oxygen in the blood. When the animal breaths in air, the oxygen in the air enters the lungs. From the alveoli (tiny air sacs in the lungs) the oxygen is moved to the capillaries (the smallest blood vessels) that lie against the alveoli. The haemoglobin in the red blood cells picks up the oxygen, and the now oxygen-rich blood flows to the heart. The heart pumps it via the arteries to all the organs and tissues that need oxygen.



Oxygen goes via the lungs to tiny air sacs (alveoli). From the alveoli the oxygen is moved to the capillaries (tiny blood vessels), and picked up by the haemoglobin in the red blood cells. The red blood cells carry and 'deliver' the oxygen to all parts of the body that need oxygen © The Nemours Foundation/KidsHealth

So, the pulse ox estimates the amount of oxygen in the body, or fancier said; it estimates the *oxygen saturation* (SpO_2). The oxygen saturation refers to the percentage of haemoglobin that carries oxygen around. When there is a problem, the pulse ox detects a drop in the oxygen levels and gives off an alarm.

The pulse ox works with infrared light to work out the oxygen saturation. When you check the diagram below, you see a human finger, and the grey part is the pulse ox clip. Above the finger infrared light is emitted. Haemoglobin absorbs light. In the first diagram there is a low concentration of haemoglobin in the blood, while the second diagram has a high concentration. Each haemoglobin absorbs some light, so the more haemoglobin, the more light gets absorbed. By measuring how much light reaches the light detector below the finger, the pulse ox knows how much light has been absorbed, and can estimate the oxygen saturation. Besides the concentration of haemoglobin, there are other factors that the pulse ox takes into account when measuring the oxygen saturation, such as the length of the light path (a thick dog tongue compared to a thin cat tongue) and the ratio of haemoglobin that carries oxygen, and those that don't carry oxygen. But then the story gets very technical 😊



The pulse ox sends an infrared light on the one side. Oxygenated blood is bright red in colour, and absorbs most of this light. A sensor on the other side measures how much light reaches the sensor, and determines the oxygen saturation. © How equipment works

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On animals it is not always easy to get a proper measurement of the oxygen saturation. The site where we place it must be well-perfused (there must be sufficient blood flow), and it must be able to transmit light. A pigmented skin (e.g., black tongue), or fur or feathers won't transmit the light. In the diagram example above, you could see a pulse ox with a clip. You can put the clip on a tongue for example, or in humans on the finger. We make use of a so-called Transflectance Sensor, because they are more versatile in wildlife work, as the typical small animal clip sensor won't work on a thick lion tongue for example. We can place this sensor under the paw, under the base of the tail, in the third eyelid or eyelid mucosa, or on non-pigmented mucous membranes in the mouth, such as the tongue or the gums.

The pulse ox sensor underneath the tongue of a leopard. © M. Bijsterbosch

The pulse ox sensor on the eye mucosa on the inside of the eyelid of a lioness. © M. Bijsterbosch

Here you can see the measurements of the lioness. The oxygen level of 94% is okay (higher is always better), and the heart rate of 64 is good (should be 42-76 per minute). © M. Bijsterbosch

The oxygen saturation should ideally be as high as possible, above 95%. This is not always possible, since the drugs we use can have a profound impact on the oxygen levels. For example, rhinos who are very sensitive to the immobilizing drugs, often have a low oxygen level. To help the rhino to breath better, we can give a drug that stimulates breathing, and subsequently the oxygen levels rise again. Another option is to give oxygen to the rhino. Also, the placement of the pulse ox plays a huge role.

Besides the oxygen saturation (SpO_2), the pulse ox also measures the heart rate. The heart rate is the number of times the heart beats per minute.

The pulse ox is a nice added device that gives us valuable information, but one never should rely on machines. We look at the breathing rate, the depth of the breathing, the colour of the mucous membranes and we feel the heart for example to see if the animal is doing well during the anaesthesia. All too often people rely on machines to do the bulk of the monitoring work in immobilised animals. We feel that this is a recipe for disaster. Even though a valuable tool, it should never be the substitute for dedicated clinical observations.

OSANANGA LILY – SLANGKOP

We have seen that in several areas in Namibia the Osananga Lilly, usually called Slangkop, is coming up again. This short article is just a reminder to be careful when you have these plants around in your veld.

The Osananga lily (*Pseudogaltonia clavata*), also known as Cape Hyacinth, 'Slangkop' or 'Groenlelie' is a common perennial plant in Namibia, and like to grow in poor sandy soils. It flowers from September to December, and flourishes in times of drought. Because they have huge underground bulbs, which act as a water reservoir, these plants are highly drought resistant and thus sprout early, even before the first rains come.

Sick eland in 2019 that was affected by the Slangkop (we immobilized and treated her). Several other eland died. © M. Bijsterbosch

Animals eating this plant are at risk of dying acutely. Symptoms may involve soiled hindquarters (diarea), dehydration, hind quarter lameness, bloat and death due to heart failure. Animals are often found near water. The flowers and young leaves are the most toxic. The problem is that during drought this is often the only 'green' there is. Under normal grazing conditions, most animals will avoid eating the lily due to the awful taste, but under desperate drought conditions, animals are inclined to eat any fresh green plant material they can get. Some say that this plant has no effect on game, and that game in general is not susceptible to plant toxicities because "they instinctively know and avoid toxic plants". There are a few exceptions to this rule. Game introduced from a different area are usually naive to the poisonous plants in their new home range, and may thus eat them. Also, if there is nothing else to eat, the game also wont have much choice than to eat this plant.

The Osananga lily has a big bulb that can grow up to 17 cm in diameter. Photos © M. Bijsterbosch

Dosing affected animals with a large dose of activated charcoal (2 g/kg live weight) is effective, as the charcoal absorbs and binds the plant toxins in the rumen, while supposedly also resorbing toxins from the blood back into the intestine. It is essential to minimize stress and exertion by keeping animals calm and rested.

Poisoning can be prevented by fencing off infested areas and/or eradication of plants by digging up the bulbs of the "slangkop". The bulbs should be thrown on a heap and burned. This should be done before the plant flowers and throws of thousands of seeds! Providing sufficient quantity and quality supplemental feeding near water points will reduce the temptation to eat the plants, while this also reduces the need of physical exertion which may precipitate acute heart failure should the animal have eaten the plant.

Seeds of the Osananga lily

WILDLIFE VETS NAMIBIA

DR ULF TUBBESING
P.O. BOX 50533, BACHBRECHT, WINDHOEK
+264 (0) 81 128 3050
ULFT@AFRICAONLINE.COM.NA

MARISKA BIJSTERBOSCH
+264 (0) 81 382 8473
+31 (0)6 4369 3095 (WHATSAPP)
MARISKA@WILDLIFEVETSNAMIBIA.COM

WWW.WILDLIFEVETSNAMIBIA.COM
FACEBOOK: WILDLIFE VETS NAMIBIA
INSTAGRAM: WILDLIFE_VETS_NAMIBIA
YOUTUBE: WILDLIFE VETS NAMIBIA

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