Wildlife Vets Namibia June 2021 Edition 39

NEWSLETTER JUNE

In this newsletter:

Dear clients,

Unfortunately, Namibia experiences the 3rd wave of Covid-19 with a dramatic rise in Covid-cases. As a result, Namibia has once again been placed on the "red list" of countries which tourists are told to avoid. Unless all Namibians wake up and take the disease seriously, expecting a quick recovery of our tourism sector is wishful thinking. As there is so much misinformation, we felt it is important to spend some time to discuss many misunderstood aspects of Covid-19 more in detail. This newsletter is a bit longer than usual, but we hope you have a moment to read it all. The last article is about animals and cold weather, how come are small animals more susceptible to cold, and what can you do to help?

Kind regards, the Wildlife Vets Namibia team

COVID-19

The ongoing surge in Covid-19 cases in Namibia is worrisome. Initially Covid-19 was a disease we read about, but suddenly we all know of close friends that have become infected, got ill, and quite a few died.

As veterinarians we certainly have no claim to be Covid-experts but, due to a strong scientific background, we have a good understanding of how this disease works! Due to the current severity of the pandemic we feel it is important to talk about it and try to dispel some myths and fake news. In spite of millions of deaths worldwide and the fact that Namibian hospitals are filled beyond capacity there are still people who try to convince us that this is merely a mild flu and that vaccination should be avoided – how stupid can we be??

After careful consideration of current scientific literature, we are very much in favour of the Covid-19 vaccine. To protect ourselves, our loved ones as well as you, our clients, the entire Wildlife Vets team has received the 1st vaccine with the 2nd dose due in 3 weeks. We limit our time in Windhoek and the clinic and wear masks. We are listed as an essential service and are thus allowed to travel outside Windhoek/Okahandja/Rehoboth area.

Whether you take the vaccine or not, is entirely up to you; nobody can force you. Due to misinformation on social media platforms, many people are scared to go for the vaccine. With this article we aim to bring some clarity and hope to help you to make a more educated decision on what to do. If you have any further questions, feel free to contact us.

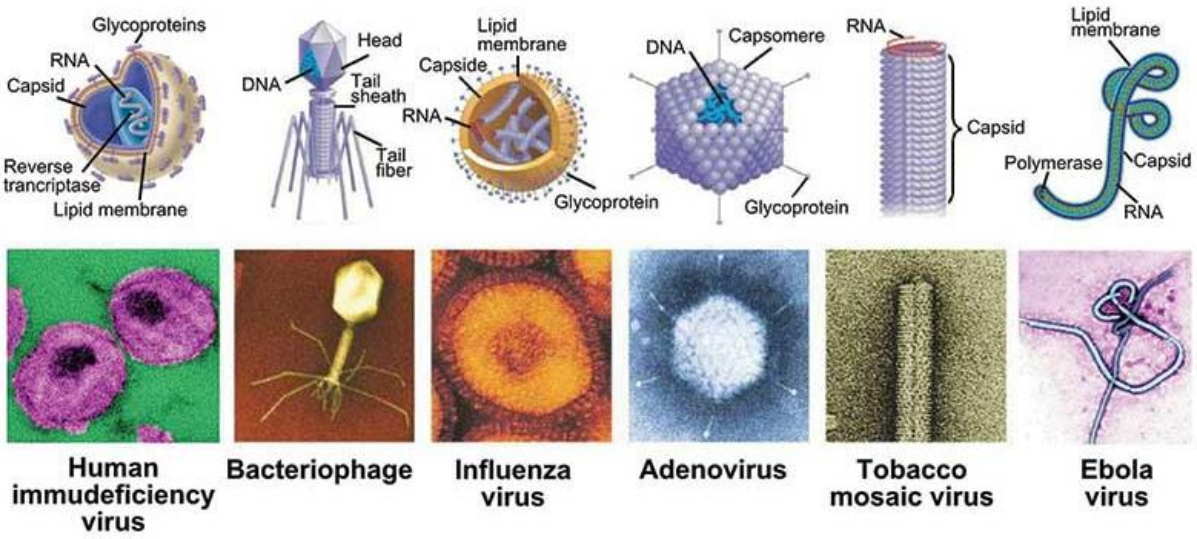
Just a quick note; in this article we will use the word 'Covid' for the virus and disease to keep things simple and readable. The virus is called 'SARS-CoV-2', while the disease is called the 'coronavirus disease' or 'COVID-19'.

Government: 'Work from home'.

Sheepdogs:

What is a virus?

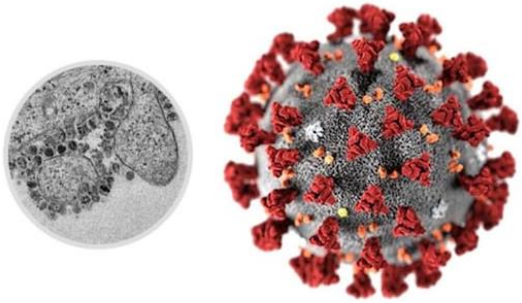
A virus is a tiny organism, not even visible under a normal microscope. It is basically a piece of genetic material (DNA or RNA), packed in a layer of proteins. It is important to know that a virus cannot reproduce without a living host cell. The virus enters a healthy cell and starts reproducing – now you are a carrier. The new virus particles start spreading to other cells, and you might get sick.



Different groups of viruses. All viruses have a nucleic acid; either DNA or RNA. The capsid is a protein shell that surrounds the nucleic acid. Some viruses also have an envelope (lipid membrane), and many develop spikes on these envelopes that help them to attach to a cell. © The Biology Notes

Another important characteristic of a virus is that, as it reproduces, it sometimes undergoes little changes (mutations) over time. A virus with one or more mutations we call a 'variant' of the original virus. When a virus is widely circulating, the higher the likelihood that a virus starts mutating. Most mutations don't have much of a clinical impact. But sometimes, depending on where the changes are located in the virus' genetic material, it can affect the virus transmission rate (it may spread more or less easily) and/or the severity (it may cause more or less illness), or it responds less to vaccines.

What is the relevance of this in relation to Covid-19? Until we have a GLOBAL level of herd immunity against this disease, new variants will constantly be formed. As is the case with the Delta (Indian) variant, it appears to be more infectious and now affect younger people more severe. The chances are that current vaccines may become ineffective against new strains means that new vaccines need to be developed. The quicker we get to a global herd immunity, the less chance of new mutations emerging, and the less need for new vaccines.



What is Covid-19?

Covid-19 is a disease caused by a coronavirus called SARS-CoV-2. It got the name due to its shape; the virus looks a bit like a crown, thus the Latin name 'corona'. The virus is spread from human to human via droplets and virus particles that are released into the air, this happens when a person talks, coughs, sneezes etc. Large droplets may fall down almost immediately, but small droplets can linger in the air and accumulate in indoor places. The disease is spread through these droplets and direct contact.

The exact origin of the virus comes from is still unknown. The disease was first reported in Wuhan City in China in early December 2019. Most evidence suggests that Covid-19 has a zoonotic background (spread from animal to man). Researchers think that a wild animal sold at a wet market might have been an intermediate host of the virus. The truth may only be known in years to come. With the SARS outbreak in Asia in 2002-2004, researchers only confirmed years later that the civet cats were the hosts.

Signs

Signs of Covid-19 can vary between people. Some infected people don't show any signs (asymptomatic), others are mildly sick, while others can become seriously ill and even die. Some of the common symptoms are cold-like symptoms: runny nose, sneezing, sore throat, coughing, muscle pains, headache, fever, shortness of breath, loss of smell and/or taste. Symptoms that can also occur: tiredness, eye pain, dizziness, stomach ache, loss in appetite, diarrhoea, nausea. Severe signs include trouble in breathing, pain on the chest, pneumonia, blue lips/face, sudden confusion and death.

Inform doctor ASAP when you have severe signs!

Don't waste time!

If you have any of these signs or have been in contact with a Covid-positive person, get yourself tested ASAP, and isolate yourself until you receive the results. If you turn out to be positive, isolate and phone your doctor, and notify everybody you have been in contact with. We are not human doctors and cannot express opinions on treatments, but some general tips when you have Covid-19:

- Take extra Vitamin C and Zinc, and sit outside in the sun (Vit. D) to boost your immune system.
- Stay hydrated.
- Rest and relax - read, watch movies, sleep etc. Your body is working hard to fight off the virus, so take it easy.
- If you have mild to severe symptoms; phone your doctor and decide whether it's needed to get medicines. Don't be a hero and take chances with this disease!
- Use of Ivermectin: This is a very controversial topic! Ivermectin is not recommend by the WHO and the Namibian government for the use in Covid 19 (it is not registered as a human medicine in Namibia BUT has been WHO registered for human use for nearly 40 years). However, we feel there is quite some evidence that people taking Ivermectin are less sick and become negative quicker (PCR test). There are many different protocols, we have been drinking Ivermectin 1% (make sure its 1%, not 3.8% - this will lead to toxicity!) based on the following dosages:
    - Preventative: 1 ml/50 kg. Take on day 1, day 3, day 5, day 7. Then weekly.
    - When you are Covid-positive: 1.1ml/50 kg daily for 5 consecutive days. After 5 days back to the normal weekly dosage.

Common Covid-19 signs © CDC

Incubation period

The time between getting infected, and getting symptoms is called the incubation period. In general, it takes about 5 to 6 days following exposure to become symptomatic. Depending on the level of exposure and the status of your immune system this could be between 2 to 14 days. Most people (99%) get symptoms within 10 days after they had contact with an infected person. That is the reason why one has to quarantine for 10-14 days.

Covid-19 Mutations

There are already 1000s of mutations of Covid-19, but only some of these pose additional risks. Some of the more important mutations are the Alpha B.1.1.7 (UK), Beta B.1.351 (SA) and now the Delta B.1.617.2 (Indian) strains with the latter becoming more and more prominent. The main difference between these mutations is the spike protein, it seems that these spike proteins attach themselves more easily to cells than others.

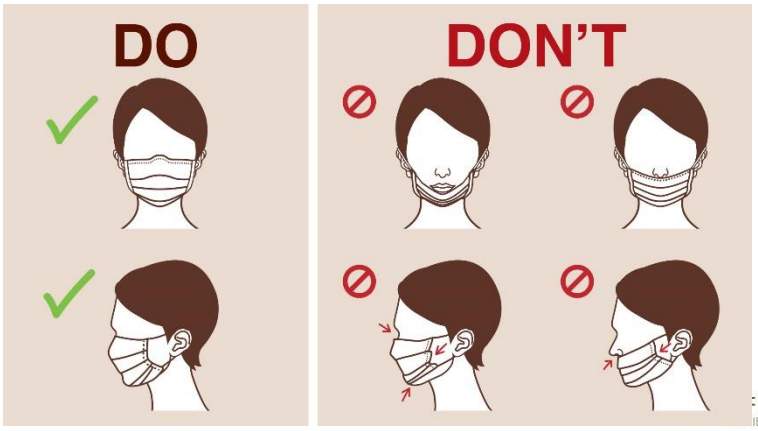
There are many different types of corona-viruses. An example we have known for years is the common feline corona viruses in mostly domestic cats (FCoV). Some cats remain asymptomatic (don't show signs), others might develop a chronic fatal disease called feline infectious peritonitis (FIP).

In man we had the Severe Acute Respiratory Syndrome (SARS-CoV) outbreak in 2002-2004 in Asia, which was soon followed by the Middle East Respiratory Syndrome-virus (MERS-CoV) outbreak in 2012 in the Middle-East and South-Korea. Now we sit with SARS-CoV-2…

Preventing Covid-19

Measures to prevent Covid-19 are well-known (or at least we hope…). The most important ones are:

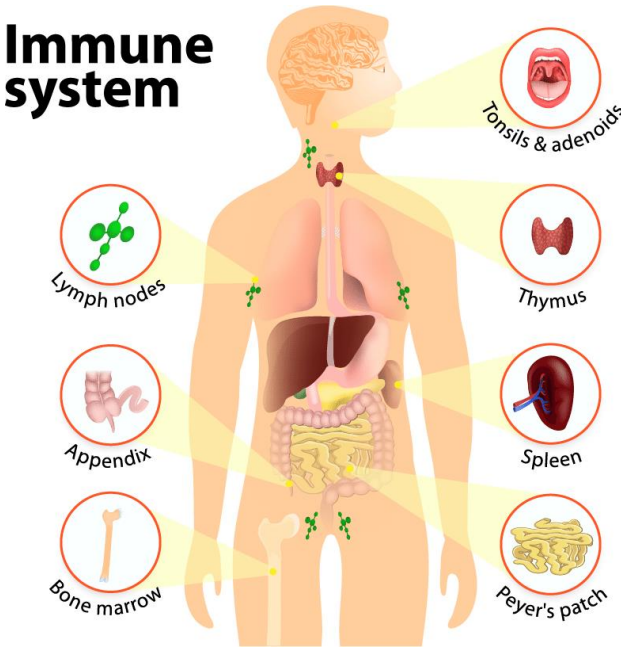
- Social distancing of at least 1.5 meters, avoid crowded places and avoid touching/handshakes etc → Avoid those Covid-droplets from landing on you…
- Wear a (proper) mask that covers your nose and mouth → Block those droplets (yours and those from others 😉)
- Wash hands with soap and water and avoid touching your face → Avoid becoming infected through contact with contaminated surfaces. The soap disrupts the lipid membrane (with the spike proteins) of the virus, making it inactive. Sanitizers are not as effective as washing your hands, unless they have a high ethanol percentage. So when you have the opportunity, wash your hands!
- If you have any signs, or have been in contact with a Covid-positive person, get yourself tested and isolate yourself.



The immune system

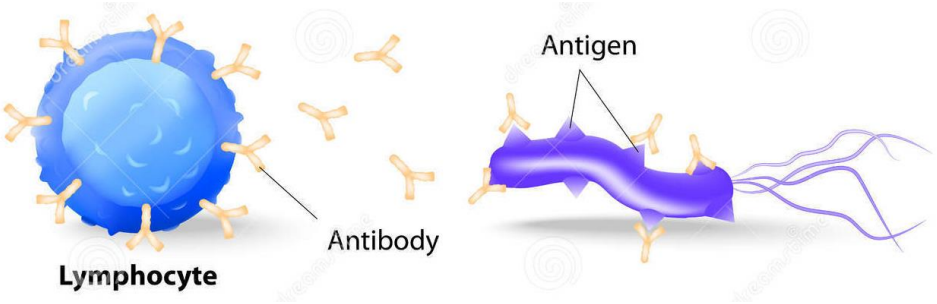
The immune system is made up of a specialized network of cells, tissues and organs that work together and are constantly on the lookout for invaders such as bacteria and viruses. Its function is to prevent or limit infection. The immune system can differentiate between normal healthy and unhealthy cells, by detecting proteins that are found on the surface of all cells. Some recognise invaders and then trigger a chain reaction, leading to the formation of antibodies and the eventual destruction of the invader by inflammatory cells.

The immune system is very complex and consists of immune specialised cells located in different organs (for examples, see the picture on the right).



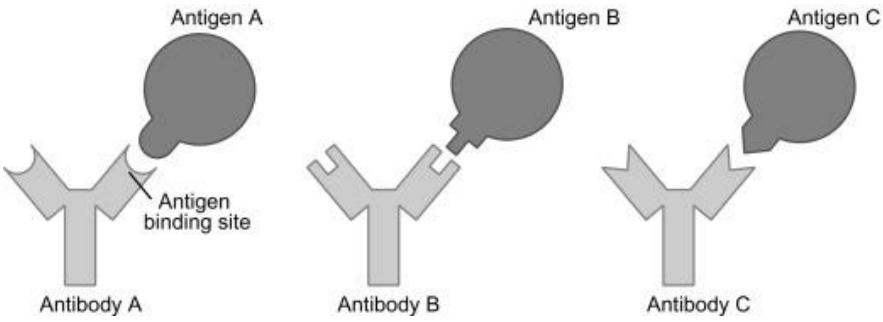
Human immune system © RevereHealth

When a disease organism enters the body, the immune system picks up specific organism surface characteristics, called antigens (Ag). This triggers the immune reaction, with the B lymphocytes (a type of white blood cell) triggering the production of specific antibodies (Ab) (also called immunoglobulins) against that antigen (see picture below). These antibodies attach to the antigen to form a so-called Antibody-Antigen complex (Ab-Ag). This then activates T lymphocytes as well as other white blood cells (phagocytes) who destroy the invaders.



The lymphocytes (a type of white blood cell) create specific antibodies. These antibodies then attack the invader (antigen). © *Dreamstime*

All antibodies produced are very antigen specific to the bacteria or virus detected. Once an Ab-Ag reaction takes place (lock and key effect), they trigger a specific immune response. These specific antibodies remain in the body, even after the invader has been destroyed. When the same invader enters the body again, the immune system will remember it, and will quickly destroy the invader before it makes the body sick. This protection is called immunity.

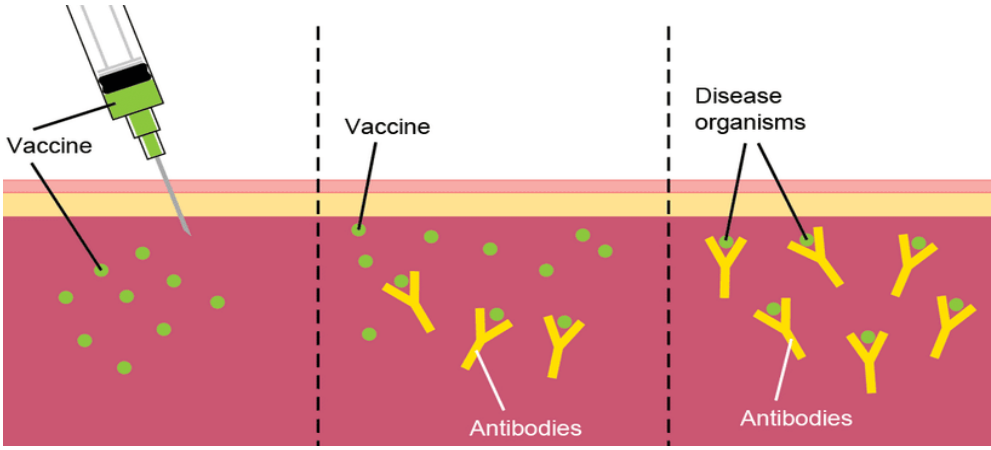


Antibodies are special proteins that lock onto specific antigens. The shape of antibodies varies, and matches the shape of the antigen perfectly. © *Thomas M. Chused*

Vaccines and boosters

Vaccines provide a patient the opportunity to become immune without having to get sick first. Generally, vaccines are made of killed or weakened versions of the disease-causing organism (antigen). When a vaccine is injected, the body basically reacts in the same way as if it was exposed to the real disease.

The immune system sees the antigen as an invader → it responds by making antibodies → it remembers the antigen and how to destroy it (see below). Next time, when the body is exposed to the specific antigen, the immune system will, with the aid of memory cells, be able to quickly identify and destroy the disease-causing organism before it can cause disease. This is how immunity is acquired from a vaccine.



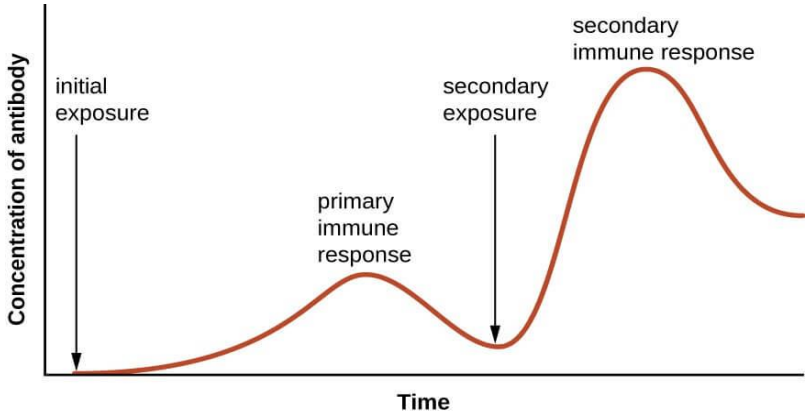
Schematic drawing on how a vaccine works; a weakened or killed form of a disease is injected. The body creates antibodies to fight against the disease. Whenever the disease comes back, the antibodies return and destroy the disease © Frank Adusei-Mensah

Booster vaccinations

As you probably know, following the first vaccination, the doctor or vet wants you, your child or your pet to return for a booster vaccination at a later stage. Why?

When a vaccine is given (or a disease is acquired), the body starts an immune response. The initial rate and magnitude of antibody production is at a modest pace, this is a primary immune response. However, following a booster vaccination or a re-exposure to the disease, there is a near immediate and massive response by the B and T lymphocytes. Antibodies circulate in massive numbers and rapidly eliminate the disease - this is the so-called secondary immune response.

When a patient is not re-exposed to a disease for a long time (months to years) the body gradually loses the advantage of the "memory cells" with the result that the patient once again gradually becomes susceptible to that disease. This explains why re-vaccination (or booster) is so important.

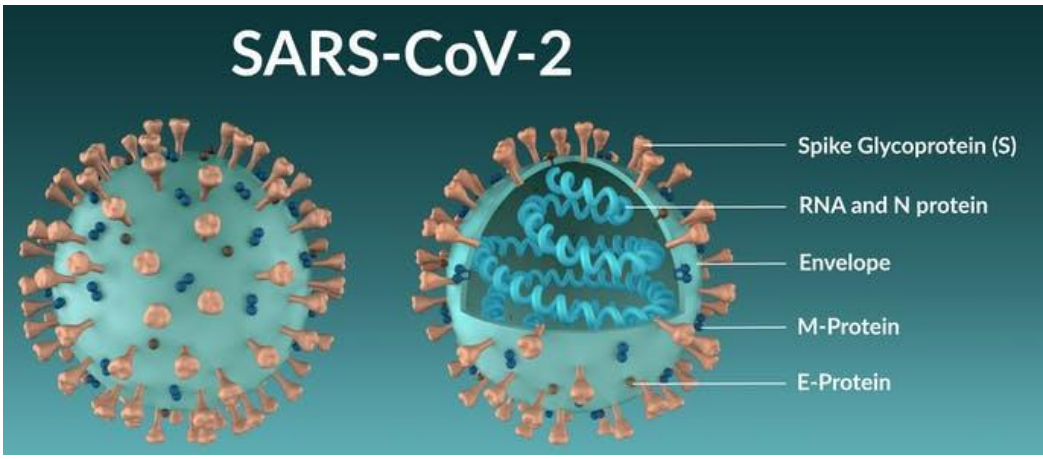


When an antigen enters the body, an immune reaction will occur after a specific time. If the same antigen enters the body again after a few months or even years, a secondary immune response will be shaped, and the antibodies' response will be faster, and longer-lasting. © Immune System Health

Covid-19 vaccines

There are different types of Covid-vaccines on the market:

- Messenger RNA (mRNA) vaccine (e.g. Pfizer and Moderna)
  - These vaccines use instructions; they contain an envelope of lipids (fat) with an instruction code that tells your cells to make spike proteins. Your immune system sees these 'foreign invaders' and starts making antibodies. The advantage is that your own immune system produces the antigen, and thus creates a strong immune response.
- Vector vaccine (e.g. AstraZeneca, Janssen)
  - These vaccines also use instructions, but they use an inactivated cold virus (that cannot reproduce and/or produce disease) with an instruction code that tells your cells to make spike proteins. Like with the RNA vaccine, your cells make antibodies. Again, the advantage is that these vaccines mimic a natural infection, and the immune response is strong.
- Whole virus vaccine (e.g. Sinovac)
  - This is a conventional vaccine like we know them, other examples of this type are rabies and hepatitis A vaccines. These vaccines contain a weakened or deactivated form of the Covid-19 pathogen (the bug that makes you sick). The genetic material of the virus has been destroyed so they cannot replicate, but still trigger an immune response.



The SARS-CoV-2 corona molecule. Here you see the typical 'spikes', or the S-proteins, which are characteristic for this virus. This spike protein is the basis for the current Covid-19 vaccines. © *Klerka/Shutterstock*

The Covid-vaccine protection is optimal from about two weeks after your second dose. Even after the first dose you are protected, but only after the second dose (booster) you really reap the full benefits. This means:

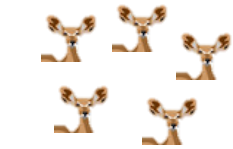
- Protection against severe disease and death in healthy people
- Great reduction of the likelihood of getting symptoms if exposed to the disease
- Reduction of the likelihood of getting infected with the virus
- If you do get infected, the vaccine reduces the amount of virus particles that are made in your body, which reduces the chance that you pass the virus on (only suggestive evidence – researchers are not sure yet)

Unfortunately, it remains unclear how long the vaccines will prevent Covid-19. It might be that the vaccines become a yearly thing, like the flu shot. It might also be that the vaccines need to be tweaked to fight of mutations of the virus. At the moment, we just don't know yet.

Social distancing

Social distancing is important in stopping the spread of Covid-19. People can spread the disease without being sick, so it is important to stay away from people. In these days you simply do not know who is sick, and who is not.

To explain this concept, lets take kudu rabies as a example. Lets say we don't have a vaccine, and a disease spreads unchecked througout a population. The disease will keep going, until herd immunity is achieved in a population (as the individuals get infected and get better, they get immune), or the population is decimated. When most of a population dies, basically social distancing comes into play, as is shown in the figure.



	In 5 days	In 30 days
High density population		
1 kudu infects	**2.5** kudus	**406** kudus
After 50% die-off		
1 kudu infects	**1.25** kudus	**15** kudus
After 75% die-off		
1 kudu infects	**0.625** kudus	**2.5** kudus

Indirect 'social distancing' effect coming into play once a disease has diminished the herd numbers on a farm. While in a high-density population 1 kudu is able to affect many more kudus, in a low-density population, 1 kudu cannot affect many more. When we look at the Covid-19 spread; this principle is why it is so important to avoid crowds, keep social distancing and adhere to the other preventative measures. The less chance we give the virus to spread, the less people get infected. © U. Tubbesing

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.

Herd immunity

In a herd (population), non-immune members of that 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. At this stage a state of herd immunity is achieved which 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.

Not all individuals within a population can be vaccinated (e.g. sick people, people on chemo therapy, those too young to be vaccinated). Effective 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. With the current vaccination rate in Namibia, it will take us years to achieve herd immunity, and thus to be internationally recognised as a safe destination... The figure on the next page shows the concept of herd immunity against rabies in a kudu population.

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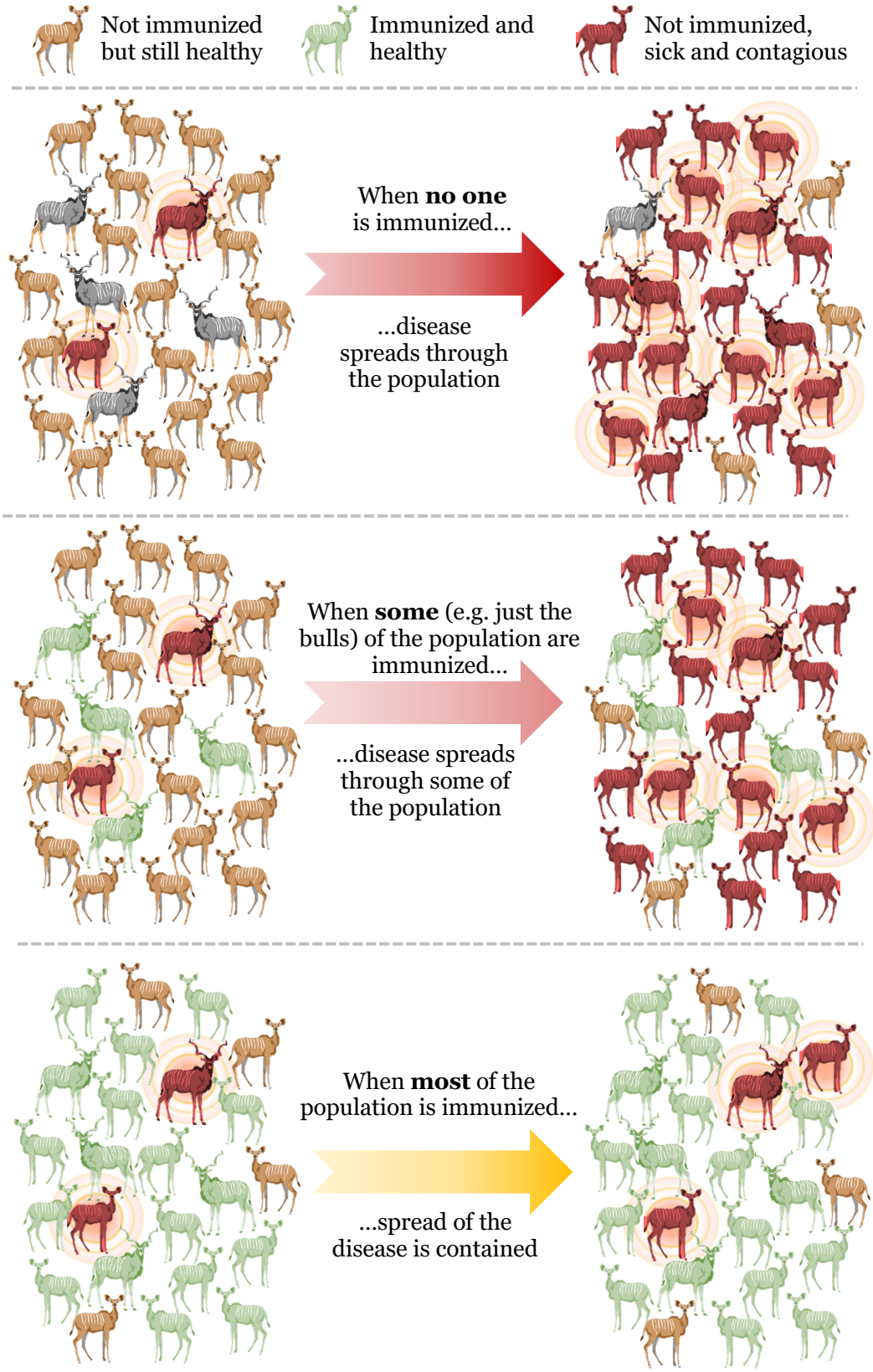
Interested in reading more about kudu/eland rabies? Have a look at our website, where we have listed 3 articles on this topic.



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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Myths and Facts

People that are vaccinated still can get Covid-19

Yes, that is correct. The vaccine will not prevent you from getting Covid-19, there is no vaccine in the world that provides 100% immunity. Vaccinated people usually only show mild disease and rarely require hospitalisation and death is very unlikely. Your recovery time will likely be quicker as well, and the vaccine might reduce the risk of you infecting other people.

So even when you are vaccinated, it is important to stick to the rules; wear a mask, keep social distancing and wash your hands.

The Covid-19 vaccine gives you Covid-19

This is not true! None of the Covid-19 vaccines contain the live virus that causes Covid-19, so they cannot make you sick with Covid-19.

Following vaccination, the vaccines can cause a response from your immune system, which can lead to Covid 19-like symptoms. You might have a sore/stiff arm, feel tired, get a headache, muscle pain, chills and possibly fever. This is normal, and beneficial! Now you know your immune system is on the roll! The side effects usually last 24-48 h.

The Covid-19 vaccine alters DNA

Not true. As you could read earlier on, some of the vaccines deliver instructions (which is genetic material) to your cells. These instructions do not enter the nucleus of your cell (where your DNA is), so they cannot interfere with your DNA.

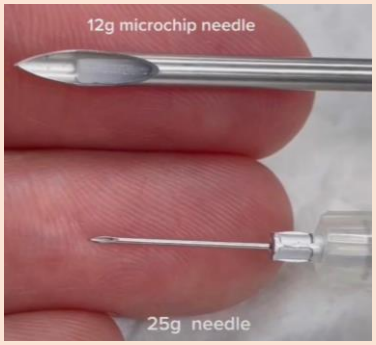
The vaccine makes you test positive

No, that is not possible. The PCR-test checks for the mRNA (genetic material) of SARS-CoV-2, the virus that causes Covid-19. The mRNA and vector vaccines only have small parts of the viral genome. The test checks for the entire genome and for the active disease, not whether a person is immune or not.

In case of an antibody (serology) test, you might test positive. These tests measure the level of immunity against Covid-19. The vaccines give an immune response, and thus might lead to a positive test.

The vaccine has a chip in it

No, not possible! If we had technology to enter a chip through a 25G vaccination needle, it would be awesome though! No need to hurt our pets anymore 😉



Covid-19 outbreaks worsen in winter

Maybe. Researchers say it's too soon to make the conclusion that Covid-19 is a seasonal virus. Growing evidence does support bigger outbreaks in winter (like we see in Namibia). Covid-19 is a respiratory virus, like influenza (the flu). Many of these types of viruses spread less easily in warm and sunny weather. Another factor is our behaviour and our immunity. With winter approaching, our immune systems often goes down. This might make us more susceptible to Covid-19. When it is cold, we huddle up inside, often with little ventilation. This increases the risk of transmission.

In general, a virus on a surface (e.g. a doorknob) degrades faster in warm and humid weather. In winter people might heat their houses, the air is dry and not well-ventilated. These indoor conditions are ideal to keep the virus particles stable. Lab experiments with Covid-19 showed that it favours cold, dry conditions, out of the sunlight.

Did you hear some specific info, and unsure whether it's true or not? Check credible (scientific) sources online (no, Facebook or YouTube are not credible...), ask your doctor, or ask us. We are no experts, but we can look into it for you, and find some credible sources 😉

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The Covid-19 vaccine is unsafe and has side effects

No, the vaccines are safe and efficient. Of course, with every vaccine, side effects are to be expected. Some people can be allergic for the vaccine. In the US, anaphylaxis (severe allergic reaction) occurred in 2 to 5 people per 1,000,000. This is the reason why one has to wait 15min after the vaccination.

Thrombosis (blood clotting) is rare, when we look at the Astra-Zeneca vaccine that has been given in the UK, the risk works out as 1 in 250,000, or 0.0004% (79 reports of blood clotting, of which 19 people died). The risk of getting a blood clot of the contraceptive pill is 0.05%...

Some are scared of the long-term effects of the vaccine. Usually, a vaccine reaction happens within 6 weeks after the final dose. Vaccines have started last year, and so far no long-term effects have been observed.

More than 2,6 BILLION vaccine doses have been administered worldwide (36.1 million daily!), and serious side effects are less than 5 in 1 million! **This is far lower than the side effects experienced with many routine medications taken daily.**

It's pointless getting the vaccine, as the virus keeps on mutating

Yes, the virus keeps on mutating, as we discussed earlier, and this is a point of concern. There are many different coronaviruses, and researchers have seen many variations of the spike proteins. When the vaccines were developed, they were tested against many different variations of these spike proteins.

Most current vaccines are to a varying degree effective against the current mutations. The likelihood is good that we have to eventually get annual boosters to protect us against new strains (similar to the flu-vaccine, which differs every year).

The later we all wake up and get vaccinated, the more chance we give the virus to mutate and eventually develop a strain that may not be covered by current vaccines! A low vaccination cover will make it more likely for resistant mutations to appear...

The spike in Covid-19 cases in Namibia is caused by the vaccines

See the comment on the vaccine making you sick... This is dangerous fake news spread by ignorant people.

In fact, people spreading such fake news carry a great responsibility for this 3rd wave and the fact that Namibia has, once again, been degraded to the red list of high-risk countries.

Conclusion

We hope we cleared some (mis)information and you enjoyed reading this article. We herewith urge all Namibians to cooperate and fight this disease. Together we can overcome this virus! Please be a responsible citizen, practice social distancing, wear a mask in public places and get vaccinated and take your workers along for the shot. This will reduce the risk of you and your loved ones, workers and especially guests getting sick.

Just imagine we had the foresight, where our government would make vaccination of civil servants working in public places (airport, national parks etc.) mandatory, and all tourist destinations (hunting/guest farms, lodges, B&B's etc.) would ensure good vaccine cover of their staff! The current 3rd wave outbreak would not have been as bad and it is quite possible that Namibia would not have been put on the red list. Consider vaccinating everybody and using this as a marketing tool for your clients "*We are proud to announce that, in addition to routine health measures, all the staff of the Big Boar Hunting Ranch are fully vaccinated against Covid-19. Not just an unforgettable hunting experience but also your health and wellbeing are our priorities*".

Countries with a high percentage vaccination rate (e.g. Israel, many European countries) have lifted most restrictions and experience very low infection rates – surely this is a good example? For as long as we refuse to "play ball", Namibia will not really come out of the Covid-19 dungeons. Being back on the travellers Covid-19 red list, is a setback that will cause most of us severe (self-inflicted) economic hardship...

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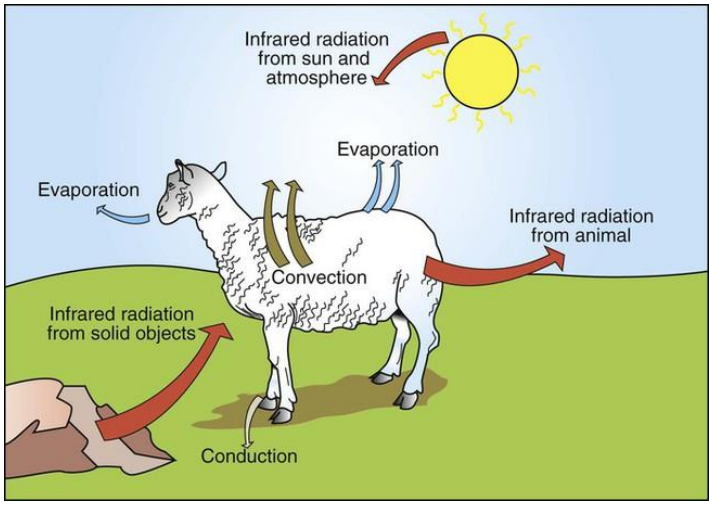
ANIMALS AND COLD WEATHER

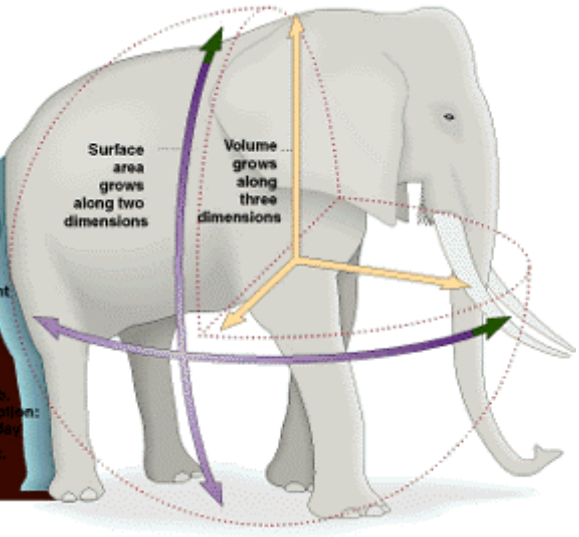
Following the good rain season, predictions of a severe and cold winter are around... This poses certain risks to our farm animals (game and livestock alike). In this article we first point out why the smaller animals (both smaller species and young animals) are more susceptible to severe cold stress than bigger animals and then we provide a couple of practical tips you may consider minimising stock losses during cold spells.

Body heat is either lost to, or gained from, the external environment via the body surface. The larger the surface area of a mammal, the greater the potential rate of heat loss or gain. Body temperature, esp. during cold spells is higher than ambient temperature, especially at night when there is no solar heat absorption. This results in a nett heat loss from the animal.

Mammals have to maintain their body temperature at a relatively constant level (depending on species between 37.5 – 40° C). In contrast to most farm animals, hardly any of the southern African game species have a protective fat layer under the skin to help insulate them from a cold environment. Any excess heat lost must be replaced by heat obtained from the breakdown of food or body tissue (fat, muscle etc) and by energy consuming muscle activity (shivering).



Representation of the heat input, and heat output between a mammal and the environment © Veterian Key



As animals grow in size their inside (volume) gets "bigger" than their outside (surface area). The larger the animal, the smaller the surface area-to-volume ratio and so the less relative area there is to lose heat. © Palaeoblog

All bodies have a volume and a surface area. When you live in Africa, you rather have a large surface area to the volume ratio as this will help to lose heat faster. However, in Antarctica, you would want a small surface area to volume ratio, as it reduces heat loss.

The ratio of surface area to body mass or volume (SA:V) is critical in determining thermoregulation. With increasing size, an animal's volume increases to the third power (x3) whereas surface area only increases to the second (x2). Smaller animals thus have a comparatively larger surface area through which to radiate heat than do larger animals.

This determines the basic metabolic rate, which is the rate at which the body uses energy while at rest to maintain vital functions such as breathing and keeping warm.

Smaller animals have, on a per kg basis, a much higher energy consumption to fulfil their basic daily functions. As soon as there is a dietary energy deficiency (typical Namibian winter and drought situation) the mere fight for survival places a severe strain on body reserves. This is exacerbated by advanced pregnancy and/or in lactating females.

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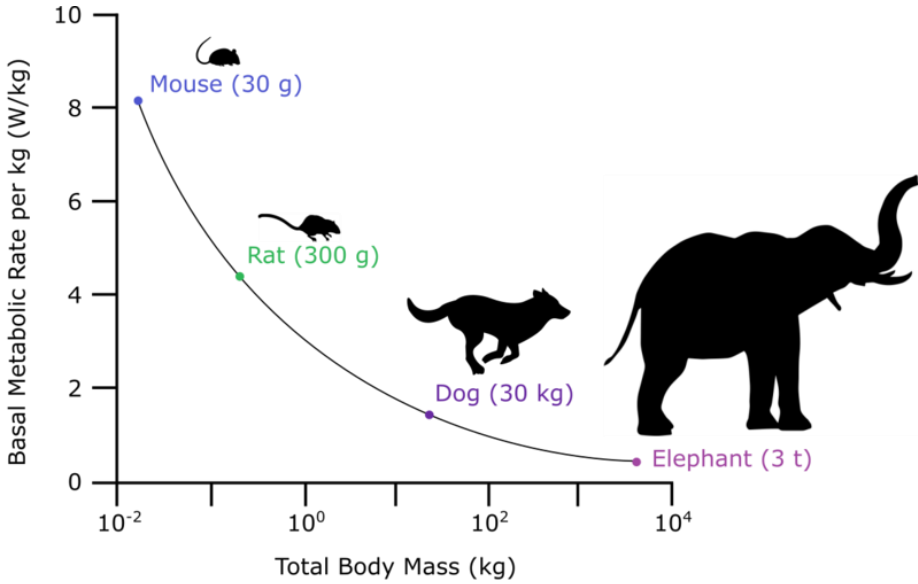
A large surface area (e.g. mouse) leads to a greater heat loss per unit mass of animal. To compensate for this higher heat loss, a mammal's metabolic rate has to be sufficiently high to maintain its body temperature at a steady value of say 38°C.

Thus, the bigger an animal, the lower its heat loss relative to its size, resulting in more modest food requirements (not in the absolute sense of the total amount of food ingested, but relative to their body size, i.e. kilogram of food per kilogram of body mass). The end result is a "relatively low running costs" for these big animals.



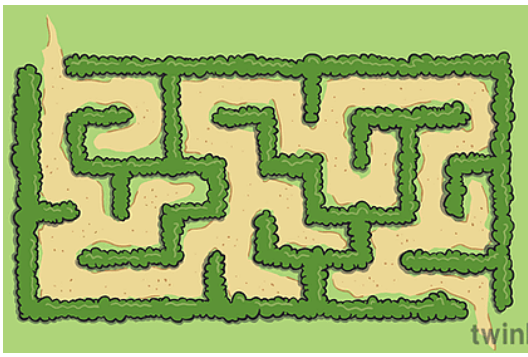
The average elephant weighs 220,000 times as much as the average mouse, but requires only about 10,000 times as much energy to sustain itself. The bigger the animal, the more efficiently it uses energy. Metabolic rate per unit mass vs. body mass for different species (respiration rate per kilogram) © CLFitzgerald

Since few African wildlife species have substantial fat layers under the skin, livestock species are generally better adapted to cold weather. However, severe wind and cold can also cause significant problems for livestock. Under extreme winter conditions farmers may have to take additional precautions to protect their animals. The following are some recommendations and suggestions to protect your animals:

- Make sure animals are in good body condition before the winter. Animals in poor body condition start utilising their fat reserves as a source of energy. We all know that fat also has an important insulation function. Animals in poor condition thus not only have minimal body reserves, they also have no physical protection against the cold. Livestock in good body condition can handle winter weather and extreme conditions better than smaller or weaker animals.
- Winter conditions predispose animals to pneumonia – vaccinate if possible.
- Cold and wet weather may result in a 100% increase in energy used to help maintain normal body temperature and function (this is especially true for pregnant and lactating animals). Failing to meet these needs may result in condition loss, stunted growth, poor milk production, weakness and death.
- Ensure sufficient and accessible supply of good quality food to provide the animals with nutrients to maintain body temperature and survive cold temperatures. Providing this food (ideally hay/roughage) in the late afternoon will stimulate rumen microbes digest hay to provide the ruminant with nutrients while fermentation in the rumen produces (at no energy expenditure for the animal) heat to protect your animals.
- Animals' water consumption increases because of elevated metabolic rates necessary to maintain warmth. Make sure water is clean, free of ice, and in adequate supply. To minimise heat loss avoid keeping animals in wet, muddy kraals. Proper plumbing and maintenance should minimise water leakage. If there are muddy areas around water troughs, consider installing proper drainage and/or making use of soil/gravel filling.

Let nature guide you; debush according to a cheetah or zebra skin. Leave dense spots for animals to hide and seek shelter. Natural patterns look more attractive for yourself, and guests.

- Shelter animals from the wind. Trees, land windbreaks, other natural weather barriers and constructed shelters will assist in blocking winds. These protected areas should provide all animals enough space to lie down safely without being trampled or smothered. Sparse density of leafless trees are ineffective windbreaks – avoid radical debushing! For game ranches we recommend structured debushing, in the pattern of a cheetah or zebra skin. Create open grass plains (the yellow part), interspersed with 1- 5 ha sized patches of denser bush (the black spots), where the animals can find cover from the elements and hide.



- Avoid excessive heat loss by providing insulation. For very susceptible animals (e.g. nyala, lambs and kids etc.) consider constructing a maze-like structure from stacked hay bales and hay bedding. These are very effective BUT, esp. for wild animals, must be constructed early in the winter (close to feeding and drinking site) to allow the animals time to get used to the structure and enter it on cold nights. Such a "maze" should obviously have multiple openings to allow easy entrance and exit.
- Try concentrating animals into sheltered spaces so that proximity to other animals provides some form of shelter and heat. Take for example the penguins in the Antarctica, who huddle up against each other against the cold. This is of course more applicable to livestock and not so much for game.
- Keep bedding as dry and clean as possible to avoid increased ammonia fumes which can irritate the respiratory lining of livestock thereby increasing susceptibility to pneumonia.
- During extreme cold spells animals should be monitored often. Specifically monitor the young/smaller animals (e.g. Nyala) that are more at risk to cold temperatures - Care for young animals first, since they have lower body energy stores and are more vulnerable than larger animals.
- When buying game, especially exotic species best adapted to sub tropic or tropic regions (nyala, lechwe, bushbuck etc.), ideally source these from game ranches where they have been exposed to cold temperatures for a few generations (e.g. nyala sourced from the Freestate area vs. those sourced from Natal adapt far better). In the case of translocations within Namibia, game from traditionally cold areas animals from the Nina/Seeis area will do better when taken to say Tsumeb than the other way round. This gives some guarantee of the animals being more cold-adapted thus hopefully reducing your losses in a harsh winter.

The tips of these sable ears have frozen off. Under normal circumstances, blood carries oxygen to keep all tissues healthy. If an animal's body temperature starts to drop, blood vessels constrict → the blood is kept close to the vital organs. This means the extremities (such as the ears) get less blood. This lack of blood and oxygen damages the tissue cells in the extremities, and ice crystals start to form. Blood cloths may start to occur, leading to further damage of the tissues. If this condition lasts long enough, the tissue dies off. This is what we know as frostbite. © M. Bijsterbosch

Want to read more on how animals adapt to cold weather? Check out the June 2020 newsletter here.

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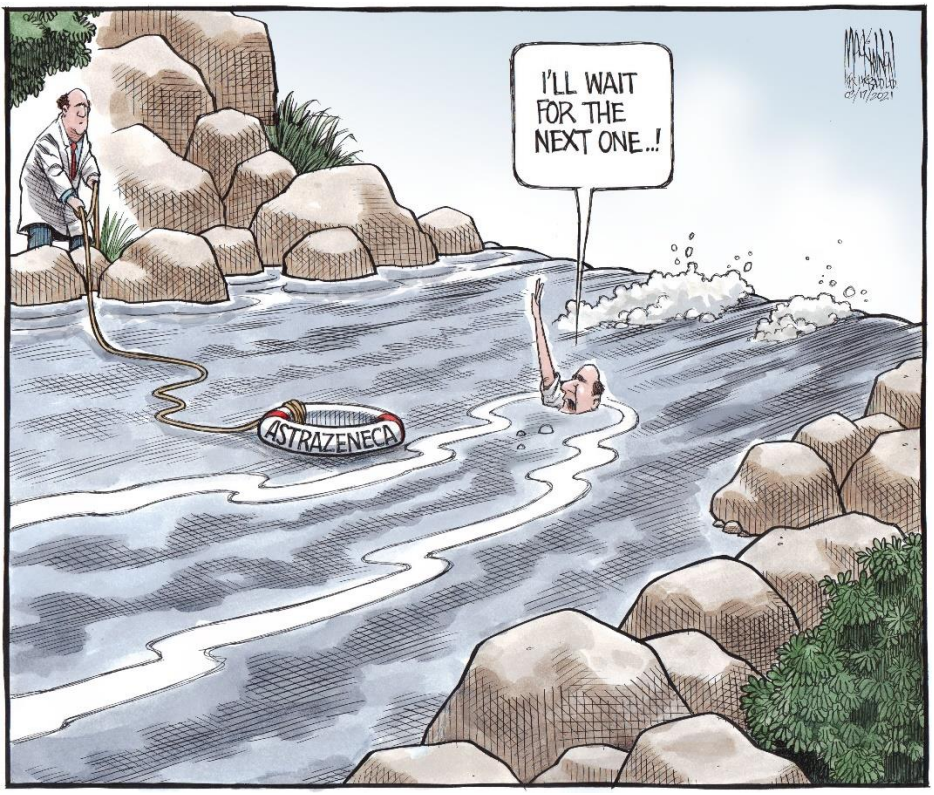

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