Feeding wildlife during a drought

In Namibia droughts are a regular occurrence and even in average raining seasons it is very likely that there will be some regions of the country that suffer from drought effects. Namibia
has an arid climate, with an annual rainfall which varies from 650 mm in the northeast to less than 50 mm along the coast. In some areas, e.g. the Namib desert, it hardly ever rains. The current drought cycle is particularly severe, with large areas of the country having experienced below average rains since 2013. The 2018/19 season is an exceptionally poor raining season with vast areas of the country having received very little rain. As a result of this, the pasture conditions country-wide are dismal and supplemental food is hard to come by and very expensive.

In this article we provide information on how to manage your animal population during a drought. Please note, this is a vast topic, and this article merely strives to give some important tips. It is by no means a comprehensive review! Some of you might have different experiences in different areas. Should you have additional information and/or tips, please share them with us!

Introduction

First things first, what exactly is a drought? There is no universal definition for drought. Namibia, being an arid country, might by some be seen as a country in perpetual drought. The <u>difference</u> between aridity and drought is therefore important to keep in mind; both are characterized by a *lack of water*, but *aridity* is more or less a *permanent* condition, whereas *drought* is a *temporary* condition. According to the <u>South African Weather Service</u>, less than 75% of the normal rainfall is regarded as a meteorological drought. High temperatures, wind, low humidity and low soil moisture aggravate drought effects.

Many species are affected by drought, but not always in a negative way. Droughts are important ecosystem regulators where dominant grazer species are usually hit the hardest. In KNP for instance the <u>buffalo population</u> dropped from +/- 30,000 to 14,000 during the 1991/1992 drought. By 2015 the population had increased to +/- 47,000 again. Predators and scavengers fare well during droughts, as there is more food and carrion available.

Although droughts are 'part of the deal' in Namibia, they can have devastating effects, leading to economic hardship, food shortages, loss of habitat and biodiversity, soil erosion, wild fires etc.

There is a sparsity of information concerning the feeding and care of wildlife during a drought. Some ask whether we should intervene by e.g. feeding animals, or if we should let nature take its course. This largely depends on the set-up. With the creation of fenced-off (game) farms and reserves (Figure 1), we have disrupted natural migration routes. In the old days, animals used to migrate to 'greener pastures' during a drought. In the commercial farming regions this is now hardly possible.







Figure 1 By erecting fences we have made it our duty to take care of our wildlife, as they often cannot migrate to better pastures. This means making sure there is water, food (grazing or supplemental food), shelter, space and proper genetic management.

When you have a fenced-off game farm or reserve, we believe it is your duty to manage your game in these difficult times. In vast (unfenced) areas helping animals by for example opening artificial water sites might have unintended ecological consequences. In Kruger National Park (KNP) for example, the installation of artificial water points led to an increased foraging pressure by elephants, which negatively impacted on the habitat and several species.

In Namibia, the next drought is always around the corner, and we should thus always be prepared. Thoughtful farm management forms the foundation in preparing for a drought.

Since we have no influence over the weather (topography, soil condition etc.) we have to make use of proper management to mitigate the effects a drought will have on our land by controlling factors, such as stocking rate (game and livestock), fire (both controlled and uncontrolled), food and lick supplementation etc.

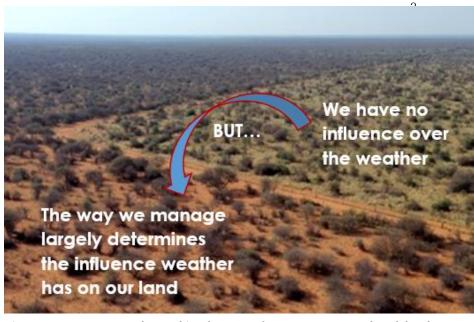


Figure 2 We cannot control everything, but many factors we can control, and thereby we influence our lands.



Proper farm management is key

Every farmer should, on a regular basis, ask him/herself the following questions:

- What is the average rainfall on my farm? How prone is this farm to drought? Are the drought effects getting worse?
- What are the soil and topographic conditions like (they influence susceptibility to soil erosion and determine soil fertility!)? Is the condition of my (top)soil deteriorating?
- What is the status of the farm vegetation like? Severe bush encroachment and/or overgrazed conditions, or well-managed vegetation?
- Which animal species would be suitable for your area? Keep climate change and the associated tendency towards reduced rainfall and increased temperatures in mind.
- **W** What should be your stocking rate?

Since farming is an ever-changing business, these questions should be constantly reviewed. A severe veld fire may turn a farm with excellent grazing into a virtual "desert" overnight. Irrespective of current weather and grazing conditions, the following management principles are always important.

In Namibia it is prudent to always have the next drought in mind when making management decisions.

Habitat preservation MUST always be the most important management goal

Overstocking must be avoided at all times! Especially during droughts it is essential to keep the number of animals sustainable. Overstocking results in poor habitat health, which obviously in turn results in a poor herd health. As the grasses grow, the animals will eat it. If there is an imbalance in grazing pressure and rate of grass growth (exacerbated during drought), grass may not reach the stage of seed production and the root systems of perennial grasses will deteriorate: leading to their decline and death. Plant- and grass species will be lost - this loss can be permanent! Perennials are replaced by annual grasses, which produce 1/3 less fodder for the same rainfall (Table 1).

Grass cover is reduced and bush encroachment starts predisposing the land to soil erosion. All in all, the carrying capacity of the area is dramatically reduced, which is costly and difficult to repair (we will cover the topic of stocking a game ranch in more detail in a future article).

Stock with species that can adapt in the area

Most Namibian game species are better adapted to aridity and drought than exotic species. Consider which species will

Figure 3 The difference in grass cover between the two camps is very obvious. It is time-consuming to regenerate grass again in overgrazed areas. Photo © <u>Mark Bishop</u>

do well in your area, and how far you are willing to go to save your species during a drought. Are you prepared to spend a lot of money and labour on feeding expensive animals like sable and nyala? Namibia habituated exotic species will fare better than freshly imported animals.



Table 1 Key differences between perennial and annual grasses (Adopted from the book 'Grasses and Grazers of Botswana and the surrounding savannah' – Veronica Roodt)

Perennial grass	Annual grasses
Life cycle last 2 years or more. Do not die after	Life cycle last a year or less. Die after flowering,
flowering; nutrients are translocated to the	nutrients are not translocated to the roots
roots.	
Rapid regrowth following the first rains,	Slow regrowth following the first rains, dormant
drawing on nutrients stored in roots.	seeds must first germinate. Thrive with good
	rains, may not germinate during a drought
Usually the nutritional value and palatability is	Nutritional value and palatability decline after
preserved throughout growth cycle	flowering
Strong root systems	Weak root systems
Robust, providing good ground cover and a	Less robust, providing poor ground cover and
high yield	usually a lower yield
Ground coverage provides soil protection,	Poor ground coverage provides limited soil
promotes water infiltration and limits erosion	protection
Climax or sub-climax species	Pioneer species
Decreasers, usually replaced by annuals when	Increasers, usually replace perennials when the
the veld deteriorates due to overgrazing and	veld deteriorates due to overgrazing and
trampling	trampling

Consider debushing (if needed)

Many areas of Namibia are suffering from tree- and bush encroachment¹, mostly due to overgrazing and in part due to the absence of mega herbivores (elephant and black rhino). The dense tree- and bush canopy, as well as an extensive root system, means that the competition for water and nutrients is fierce, resulting in poor grass germination, growth and thus grass cover. In addition to reduced browsing pressure (absence of mega-herbivores), bush encroachment is encouraged by seed dispersal, veld fire suppression, climate change (less severe winters/frost) and most importantly grazing mismanagement. Under optimal grass cover conditions bush seedlings are at a comparative disadvantage regarding water and nutrient resources.

Table 2 Impacts of bush encroachment (Adopted from the report 'Bush control manual' – Axel Rothauge)

Negative impacts	Positive impacts
Reduced grass-based carrying capacity	Soil is better protected against erosion (strong root network)
Less biodiversity	Enriches the soil with nitrogen – grass explosion after debushing
Poor visibility (security, scenic views, implications for tourists and hunters)	Food for browsers and occasionally grazers during dry times
Negative impact on groundwater recharge	Wood can be used (firewood, charcoal, wood chips, animal feed)

After debushing, it takes time before the land recovers, this depends on the bush control measure, rainfall, soil fertility etc. Bush encroachment and debusing are vast topics, and fall outside the scope of this article. If you want to read more, the 'Bush Control Manual' written by Dr Axel Rothauge is a good place to start.

¹ Bush encroachment is an increase in woody plants (shrubs and trees), that result in a loss of grass cover





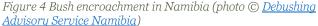




Figure 5 This picture was taken in Angola; in the bushy areas there is no or hardly any grass growth (photo © M. Bijsterbosch)

The various methods of debushing (fire, chemical, manual or mechanical debushing) each have their advantages and disadvantages. Before embarking on an expensive debushing exercise, we strongly advise that you discuss the options with professionals.

We often observe farmers doing some very radical debushing, where big areas are left without (or very few) trees/bushes standing. Especially for game farms this may have severe consequences since bush provide food for browsers. The much-maligned blackthorn *Acacia melifera* – now called *Vachellia melifera*, is usually the first bush to start greening, flowering and producing pods following winter and thus providing essential food for browsers like kudu. In addition, a well-structured bush and tree cover provides nutrients to the soil, as well as shelter against the elements (sun, heat, severe winds etc.). It is very well known that many game species hide their young offspring for the first few days of life and some species like kudu and nyala may experience very high mortalities during severe winters, esp. in the absence of sufficient shelter and food.

We recommend game farmers to consider doing structured debushing, in a pattern of a cheetah skin. Create open grass plains (the yellow part), interspersed with ½ - 1 ha sized patches of denser bush (the black spots), where the animals can find cover from the elements and hide (Figure 6). As an alternative, you could try something in line of a zebra skin pattern, which provides game habitat corridors to move in. Whatever you do, **please** try to avoid long straight lines. These are not natural and actually make for rather boring game viewing and/or hunting.





Figure 6 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 (photo cheetah skin © M. Bijsterbosch, zebra skin © Pixers)



Always leave big trees and evergreen trees (e.g. Blinkblaar/wag-n-bietjie, Witgat, Karee species etc. (Figure 7 - Figure 9)) standing and do not debush in river beds. The riverine habitat supports a wide variety of plant and tree species which, following the dry season, start growing earlier than the rest of the veld.



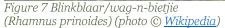




Figure 8 Witgat (Boscia albitrunca) (photo © Seeds and All)



Figure 9 A cluster of Karee trees (Searsia lancea) (photo © <u>Heather Elke</u>)

The bushes and trees that are being cleared should ideally not just be left in place to rot. In our dry weather conditions it may take many years (esp. for the hard wood varieties such as sekelbos) before these trees and shrubs are decaying and adding to the soil compost. Consider mulching them in the field and leave the mulch on the soil. The advantages of this is that it will provide a cover to slow down evaporation, it will protect the soil against erosion and positively contributes to soil fertility much quicker. A very good alternative use of the mulched bush (esp. under drought conditions) is obviously the production of feed (boskos, see page 10).

If neither of these options is possible, it is best advisable to flatten the cut trees/bushes to the ground (Figure 10). Provided the resulting cover of dead tree trunks and branches is not too dense and high (e.g. bulldozed onto a big heap where top soil is damaged and exposed to erosion), the dead branches will initially prevent animals from reaching new grass growth, thus allowing grass (esp. perennials) to grow into strong plants before being exposed to grazing. In addition, the decomposition process will be accelerated in tree trunks and branches when they are in close contact with the soil. Since soil erosion is a major problem on all degraded land, farmers should give serious consideration to using material from felled bush and trees to "plug up" smaller erosion ditches.





Figure 10 Flatten the cut bushes and trees to speed up the decomposition process. In addition, the bush cover will prevent animals from eating the new grasses (photos © <u>Joubert and Zimmerman</u>)



After debushing, (and depending on your situation) it might be worth rehabilitating grasses either by sowing seeds or indirectly, through natural reseeding after feeding your animals with hay produced in Namibia (see page 9). Since it is not easy to commercially obtain a grass seed mix suitable for Namibian conditions, we would recommend that you consider harvesting grass seeds from road reserves in your area. Road reserves contain the typical vegetation of your area under prime conditions and are thus also likely to include grass species that may have disappeared from your land. Feeding hay harvested from these road reserves is likely the best and most economical way of reintroducing climax grass species to your land. In cases where you cannot obtain hay from the road reserve (too low grass yield to harvest it economically, too rocky terrain or dense bush etc.), harvesting grass seeds is your next best bet. If you decide on this step to speed up the recovery of a camp, you might want to make sure that animals cannot get to the newly sowed grass, by fencing it off (we will cover this topic in more detail in another article).

Responding to a drought

In a natural situation the animals would migrate to better areas, but due to fencing this is often not possible. It is therefore our duty to take the necessary management actions to minimise starvation and animal suffering. During a drought (or even preferably before a drought is expected!), the following steps should be taken.

Manage your game numbers

We probably all agree that the ultimate goal of any farming enterprise is to, over the long term, obtain the optimal return (Figure 11). There is now an abundance of evidence which demonstrates that this is best and most sustainably achieved through <u>moderate rather than high stocking rates</u>. As soon as we overstock, the variable costs (supplemental feeding, additional labour etc.) increase and devour all potential profits to the detriment of the habitat.

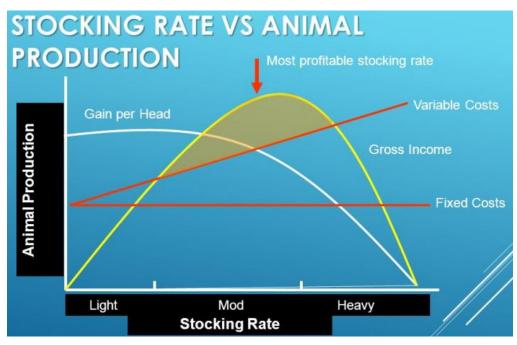


Figure 11 Stocking rate versus animal production (© <u>Smith</u>)



The African savannah biotope is well suited to host its great variety of herbivores even through dry years. Just consider the species range, from fine to coarse grass eaters and then the browsers with their incredible adaptation in both size and selectivity. With this biodiversity makeup there can surely be no better overall biomass stocking possibility than a well-managed game ranch! Why is it that specifically game ranches are often more severely affected by drought than livestock farms? There are a number of reasons:

- Livestock is an "easily managed" commodity. If you have a drought (or a veld fire) you can literally herd the animals into a kraal, load them and move them to different pastures or the abattoir. If you are a game rancher, you have a very different challenge!
- We believe that fewer than 5% of game ranchers undertake any regular (at least every 2 years), science-based form of a game count. In the famous words of Lord Kelvin "To measure is to know". If you don't measure it, you can't improve it. Needless to say, without accurate game numbers at hand, a game rancher can't make proper management decisions!
- As game farm owners we feel compelled to compete with classic examples of wildlife reserves (e.g. Etosha, Serengeti, Kruger National Park) and thus strive to offer our clients (eco-tourists and hunters alike) a similar experience of an abundance of game. This is the source of all evil since:
 - We are managing "small" FENCED areas and not open, "unlimited" space. Unless
 we adapt to that realty, our game, which can't migrate in dry years, will starve in
 front of the camera lenses of our clients hardly good marketing!
 - o Big nature reserves (and livestock farms) are naturally stocked at ecological capacity (maximum the habitat can carry at the time). If a drought/fire comes, the livestock farmer can quickly (and "inexpensively") move his stock, while nature regulates populations in game reserves through a massive die-off and then a gradual recovery back to maximum carrying capacity. Then, some years later, the cycle repeats itself... what can we say, nature is harsh?
 - o As game ranchers we can't "have our bread buttered on both sides AND eat it"! We should stock our ranches at economical rate (50-75% of the ecological capacity), since this provides you with some breathing space in the event of a drought AND at that stocking rate you have the proven maximum sustainable yield (MSY). This is based on the fact that, as long as the habitat adequately provides in the needs for the animals, they will reproduce at a maximum rate, whilst the mortality rate will be low. Once the habitat deteriorates through overgrazing the picture is reversed.
 - o Game ranchers rarely keep the inherent annual population growth rate (around 25% for most antelope species) in mind when setting management goals. A large proportion of game ranches use trophy hunting as their main financial activity. If taken too far (also with unjudicial biltong hunt), the population sex ratio shifts to a predominantly female population with a resultant insidious yet rapid population growth. If not managed properly, this leads to severe overstocking.

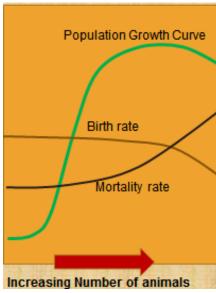


Figure 12 Population growth curve (© U. Tubbesing)



When the pasture on a given farm is sub-optimal or the stocking rate approaches (or more likely exceeds the ecologic stocking rate), reducing the number of animals should be the first step. This is obviously a difficult decision to take, but earlier is better than then too late. By selling early, you ensure that your game is still in fair to good condition, ensuring that you still get relatively good prices for your animals. In addition, you reduce the strain on your veld, thereby preserving your habitat and ensuring a sustainable farming enterprise.

Once you have made the decision to remove animals from your farm (irrespective if by game capture, biltong hunt or culling), strive to first take out the old, weak and those with poor genetic traits. In this way you ensure that the remaining animals (which you will use to rebuild your herd) are of superior quality.

Feeding roughage

Because wildlife is highly diverse, specialized, and difficult to manipulate, feeding game is not as easy as feeding livestock. Extensively farmed game is usually not used to supplemental feeding and often take weeks before getting accustomed to it. For more information on what influences feeding behaviour in animals, read and download our online article 'Change, the driver of feeding behaviour in (wild) animals' here.

When it is apparent that the grazing won't be able to sustain your game until the next rain season, buy food early (when still "cheap") and start feeding your animals at an early stage, before their body condition drops severely. In this way you will minimise stock losses and reduce the grazing pressure on your pasture to ensure a quicker recovery after the first rains.

It is important to feed in multiple different areas of the farm **and** to, per feeding site, spread the hay out over a bigger area. This will ensure that:

- All the animals get a chance to eat (older cows and young calves)
- To avoid excessive animal density and thus habitat damage limited to one spot
- To promote reseeding from the feeding sites. While eating, the animals will break soil crusts, trample hay/grass seeds into the ground, and defecate/urinate in those areas, thereby creating a "well prepared" seed bed for the next rainy season. It should be obvious that the habitat will benefit greatly from you continuously shifting these feeding sites to avoid excessive trampling and to ensure that as big an area as is practically feasible is benefitting from this rehabilitation process.

During a drought it becomes progressively more difficult to buy good quality grass hay. Poor quality hay may be made more palatable to game by adding lucerne (sprinkled over the bulk of grass) or flavourants, such as molasses or orange flavour (which can be dissolved in water and then sprayed

over the food). This increases the palatability, and thus the likelihood that animals will eat the grass. Adding molasses also adds a source of energy and it will bind dust, especially in old grass.

Lucerne is an excellent supplemental feed as it is high in protein and minerals, but it is relatively expensive and, unless there is a sufficient stand of pasture grass on the farm, should not be fed as a sole source of supplemental food. Especially browsers like kudu, nyala and giraffe will benefit greatly from the addition of camelthorn pods, maize corn etc. as additional source of energy.



Figure 13 Lucerne cultivation in 2013 at Ogongo campus (photo © <u>UNAM</u>)



Boskos

Another option, which was mentioned before, is to use your debushed material as boskos (bush-to-feed, Figure 14). The debushed material is harvested and milled, and then mixed with suitable supplements to increase the nutritional content and/or the digestibility of the feed. Commonly used are *Acacia mellifera* (Black-thorn acacia/Swarthaak), *Dycrostachys cinereal* (Sickle-bush/Sekelbos) and *Rigozum trichotomum* (Three-thorn rhigozum/Driedoring).

Be aware that producing animal feed out of debushed material is a complex process, and when it is wrongly implemented, it can create health risks for your animals! Always consult an expert before starting with such operations. For more information read 'Animal Feed from Namibian encroacher bush', written by Honsbein *et al.*









Figure 14 Bush harvesting and animal feed production in North-western Namibia (photos \odot <u>De-Bushing Advisory Service Namibia</u>)



Supplements

There are suggested supplements on the market that can be added to supplemental feed. We will only briefly discuss a few of the more important ones.

<u>Licks.</u> We believe that there are very few farmers in Namibia that don't routinely supply their animals with licks. It may, however, be worth your while to call an animal nutritionist (e.g. at Feedmaster in Windhoek) and discuss possible needs or excesses (of trace elements etc.) the animals in your area are likely to experience. Chances are that you can do better for your animals than just supplying a salt lick.

<u>Browse Plus®</u>. 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. When browsers eat, they stimulate the bushes and trees to release chemical substances (tannins) which deter browsers and thus prevent over-utilisation.

Under drought conditions, even grazers have little choice other than to eat browse, resulting in over-utilisation and possibly tannin toxicity. The ingested tannins can cause a loss of appetite, it lowers the digestibility of the food and can even lead to organ damage and death.

Browse Plus® helps to prevent the absorption of tannins, modifies the structure of terpenes and neutralizes their bad effects. It will increase the intake of less palatable grass and browse and also promote the digestion and absorption of vital nutrients.



Figure 15 Browse Plus by Virbac (photo © <u>Fivet</u>)

<u>Camel thorn (Vachellia erioloba) pods</u>. These pods are very tasty, well digestable and highly nutritious (Table 3); making them an ideal source of supplemental food (Figure 16, Figure 17). A hidden benefit from feeding camel thorn pods is that the game will spread the seeds on your farm and in that way assist in the re-seeding of these valuable trees.

Table 3 Comparative ruminant nutrient values for lucerne vs. camel thorn pods

		•	
	Unit	Lucerne	Camel thorn pods
Organic matter	%	63.3	83.6
digestibility			
Energy digestibility	%	59.8	81.3
Digestive energy	MJ/kg DM	10.7	15.4
Metabolizable	MJ/kg DM	8.5	12.4
energy			
Dry matter	%	90.6	91.6
Crude protein	% DM	18.3	13.2
Gross energy	MJ/kg DM	18	19
Calcium	g/kg DM	22.1	6.6
Phosphorous	g/kg DM	2.7	1.3

11









Figure 17 Roan antelope feeding on pods (photo © Portugal Wildlife)

<u>VERY IMPORTANT</u>: Even though palatable and nutritious, do NOT feed Prosopis pods (Figure 18) since these seeds will also be seeded out on your farm and the trees will cause you endless problems in years to come.



Figure 18 Pods from the Prosopis glandulosa (photo © <u>Garden Oracle</u>

<u>Maize (millies)</u> fed in a whole pit form can be a valuable supplemental source of energy. To avoid overeating and a subsequent rumen acidosis (suur pens) we suggest that you start with giving small amounts at a time and mix these into the grass/lucerne hay. Once the animals become accustomed to eat these, you can gradually increase the amount fed to a hand full per animal per day.

<u>Game pellets</u> make an excellent but expensive source of supplemental food and are thus usually reserved for high value species/exotic species in smaller game camps.



Recovering from a drought

Towards the end of every dry season and especially a drought cycle we live in hope of a good rain season. It is important to allow your grazing to recover adequately before you consider stocking up with animals. Neglecting to do this will most certainly result in progressive and severe land degradation that will see you more and more vulnerable to the effects of future droughts.

Be aware of the risk of flash floods and soil erosion following the first rains. These may cause severe damage to your infrastructure (dams, roads, fences etc - Figure 19). It would be prudent to start taking steps to avoid water just flowing off your farm causing severe erosion damage.



Figure 19 Heavily eroded road in the DRC due to flash floods and bad maintenance (photo © U. Tubbesing)

Concluding remarks

Droughts can be devastating for men and animal. Whether you believe in global warming and climate change or not, it cannot be denied that our weather patterns are changing. Farmers must think carefully about the viability of their current farming practices. With the changing climatic conditions, we will only be able to farm successfully if we have a vision and are willing to adapt our management practices (including planning for the next drought even in a good season).

In summary, make sure your veld is not overgrazed, and debush when you have excessive bush encroachment. During a drought, the most important step is to reduce the number of animals on your land. When there is not enough grazing for your animals, start with supplemental roughage. Start rather sooner than later, as it will take time for the wildlife to accept the feeding, and once the body condition is poor, it will be difficult to get them in a good shape again. In consultation with an expert, assess the viability of making and giving boskos to your animals. Consider other supplements, such as licks, Browse Plus®, camelthorn pods, maize etc.