

# DROUGHT MANAGEMENT STRATEGIES FOR NAMIBIAN RANCHERS

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## ABSTRACT

Namibia, the driest country in sub-Saharan Africa, experiences more years of below-average than above-average rainfall. Extensive livestock farmers should have drought contingency plans, but too many react on an *ad hoc* basis and depend on decreasing government support. A three-pronged survival strategy is suggested, consisting of anticipatory measures, drought crisis management *per se* and drought aftercare.

In the preparatory phase, farmers are advised to heed ever more accurate drought forecasts by meteorological services, accumulate fodder banks, apply systematic veld resting to ensure grazing reserves and establish pastures of indigenous grasses and plantations of drought-resistant fodder plants. Livestock herds should become more flexible by containing at least 30% (of carrying capacity) filler animals, which can be readily disposed of, depending on forage conditions and market prices. Such a high proportion of fillers requires deliberate actions, as it is not achieved by routine herd management. Income generated by the sale of fillers should be retained to cover drought-related emergency expenses.

Drought crisis management consists of progressive destocking in accordance with the worsening forage situation while utilising the accumulated fodder and monetary reserves to buffer the effects of the drought; even pen-feeding the nucleus herd. Once the rains and veld condition improve, the veld requires an initial period of recovery based on the phenophase of certain indicator species before restocking occurs.

Individual farmers need to have their livestock numbers track the rainfall, but to be successful, any drought survival strategy needs a conducive policy environment created by government.

## INTRODUCTION

Drought, an extended period of abnormal dryness due to below-average or badly timed rainfall that causes a pronounced decrease in forage yield relative to what is expected in an average year (Child *et al.*, 1987), afflicts Namibia with great but unpredictable regularity (Botha, 1999). It has been noted that Namibia receives many more seasons of below-average rainfall than average or above-average seasons (Olszewski, 1993), indicating obviously that the next drought is just around the corner, but also that - when an above-average season eventually occurs - it is more likely than not associated with calamitous downpours with costly consequences. In a country that occupies nearly 2.7% of Africa's surface area (823 000 km<sup>2</sup>), 16% is hyper-arid, a true desert where agriculture of any kind is excluded. Of the remaining area, 49% is classified as

arid, 32% as semi-arid and 3% as sub-humid (Seely *et al.*, 1994) and it is here that droughts threaten the stability of the country's economy. Depending on drought, agriculture contributes 5.9 - 10.3% to the GDP and is the third to fifth most important sector of the economy (MAWRD, 1999).

A thinly populated country with just 1.8 million people (0.2% of the population of Africa) and a dualistic economy so typical of southern African states, 70% of its population is in some way or another dependent on farming (Moyo *et al.*, 1993). Namibia's approximately 5000 commercial and countless communal subsistence and semi-commercialised farmers cannot evacuate their drought-stricken farms and temporarily or permanently escape to a moister, more stable environment; they are forced to live with the drought and manage its effects. The aim of this paper is therefore to propose a basic management framework for Namibian ranchers (i.e. those farmers dependent on extensive livestock production and veld grazing) below the policy level to be prepared for the next drought, manage it better and come out of it with their basic production capacity intact and ready to resume livestock production at full throttle.

Why is it necessary to re-investigate such a recurrent issue? Because our environment is constantly changing and large farming areas, both commercial and communal, are degrading, i.e. man-made droughts occur more frequently, in addition to the regular natural droughts. In communal areas, time-honoured survival techniques such as transhumance (moving livestock to cattle outposts, moving between summer and winter grazing grounds) are becoming increasingly infeasible due to rising population pressure, illegal fencing and other measures, which restrict mobility of subsistence farmers. In commercial areas, ranch sizes are shrinking (although game farming seems to be reversing this trend), government-held reserve grazing has been abolished and the trade in leased grazing has not yet developed sufficiently. The end result is that Namibian farmers are increasingly vulnerable to drought and drought awareness needs to be re-kindled.

Three distinct phases can be identified in drought management. First, and of vital importance, is strategic advance management in anticipation of a drought. A farmer who prepares for a drought and its effects in good time is simply in a much better position to withstand it than one whom is surprised by it. Secondly, there is the phase of crisis management during the drought itself, when a rancher has to shoulder the burden and carry it. Finally, after the drought, some aftercare is required to bring the ranching operation and its resources into tip-top shape again (Table 1).

Table 1. The three steps that drought management in Namibia should consist of

Objective	Action	When taken
1. Strategic anticipatory management	Heed <b>meteorological warnings</b> (pay attention to the weather forecast)	Always
	Manage the herd for increased flexibility and <b>elasticity</b> (increase fillers to 3rd of feed requirement)	Adjustment to production systems (early in ranching career)
	Build up a <b>fodder reserve</b> of rested veld (10-33% of ranch), dryland cultivated pastures of indigenous grasses (5% of ranch), plantations of drought-resistant fodder crops (another 5%) and opportunistically-made hay (from vleys and roadside reserves). Create a biological buffer	Deferred grazing is a function of a particular grazing system. Planted forage reserves should be established early and extended progressively in good years. Veld grass hay should be made opportunistically in seasons of good rainfall from surplus grazing
	<b>Dispose of fillers</b> progressively in accordance with the advancing drought (stocking rate tracks rainfall)	Sell during early drought before markets are swamped and while fillers are still in good condition
	Keep income from emergency livestock sales for drought-related expenses ( <b>financial buffering</b> )	Early drought and throughout. However, needs a sympathetic tax policy from government
2. Drought crisis management	<b>Destock further</b> , beyond fillers, to 40-45% of "normal" stocking rate	As drought worsens
	Consider <b>pen-feeding</b> the nucleus herd	When even optimists know that they are in trouble, but before the soil is bare
	Use accumulated <b>fodder reserves</b>	Before and during pen-feeding
3. Drought aftercare	No grazing until indicator <b>grasses seed</b>	Once it starts raining again
	<b>Restock progressively</b> by buying in fillers; maintain herd elasticity	In accordance with improving carrying capacity (track the rainfall)
	<b>Re-consider</b> production system, or fine-tune existing system, or diversify	Before restocking, to buy/retain livestock which suits the modified production system. Do not wait until things are going well; people are reluctant to change in good times!

### ANTICIPATORY MANAGEMENT IS THE KEY

The incidence, duration and intensity of droughts cannot yet be predicted, but from Namibia's known climatological record over the past 120 years, we know that the next one is about to strike. However, meteorological predictions are becoming ever more accurate and earlier (Mason *et al.*, 1996). Such early warnings should initiate the rancher's advance actions, the most important of which would be to destock a little, early in the rainy season, but progressively more and more as the drought reduces veld productivity, until he cannot sell any more animals as it would seriously undermine the reproductive ability of his herd. By selling early, before everyone else sells and while his livestock is still in good condition, the rancher would hopefully obtain a reasonable unit price for his animals and should keep this income in reserve for the inevitable expenses arising during a drought, its associated lack of income and the herd-rebuilding phase afterwards. Of a more long-term nature are measures to buffer a drought biologically, by building a fodder bank with multiple components and to stock the range conservatively to ensure adequate veld resting.

Increased understanding of regional and global weather patterns has enabled meteorologists to predict early in a rainy season (by, say, August) whether a drought can be expected. Global weather patterns in far-off parts of the world, e.g. the western Pacific Ocean, can no longer be ignored, as their effects, such as El Niño, may have devastating if somewhat

contradictory effects on Namibia (Smit, 1998). Because of the region's vulnerability to drought, SADC has instituted an early warning system (SADC Regional Early Warning Unit in Harare, Zimbabwe) which, besides food security based on cereal production, also monitors the progress of the rainy season and veld response, and ranchers should heed its output. Similar monitoring systems are currently being set up in Namibia, e.g. the assessment of carrying capacity country-wide through remote sensing (Ganzin, 1999) and can be used to assess the accuracy of the weather prediction. The rancher should bear in mind that a one-off season of poor rainfall (as little as 60% of the average) is unlikely to force destocking if he stocked correctly before (Gammon, 1998). If his grass sward contains a healthy amount of perennial grasses, these will be able to produce satisfactorily even on 60% of normal rainfall.

If an early warning is received, the rancher should sell some of his livestock immediately. Most cattle and sheep herds contain underperforming, old and sickly animals, which limit production efficiency and have soon to be got rid of anyway. The best time is when a drought can be expected, since it would waste valuable feed resources to maintain these under- and unproductive animals in times of nutritional stress. However, herd models indicate that these animals constitute at most 10-15% of the herd's feed requirement in production systems which do not produce long weaners (tollies/steers) (Rothauge *et al.*,

1998). While a reduction of between one-tenth and one-eighth in total feed requirement is commendable, it will not be sufficient to balance the shrinking feed supply experienced during the drought. A greater effort at destocking is required.

In areas and in societies where traditional coping mechanisms (e.g. transhumance and nomadism) are no longer possible, which is increasingly the case even in Namibia's traditional societies in the north because of increasing population pressure, illegal fencing and changing values and economic systems (Behnke, 1998), herd compositions have to become more flexible to allow for a greater reduction in feed requirement during times of shrinking feed supply. The proportion of reproducing animals in a herd has to be reduced to a level fitting the aridity and drought-vulnerability of the ranch (decided on by the rancher based on his experience) and the herd topped up to grazing capacity with so-called "filler" animals (Danckwerts and Tainton, 1996). Fillers can be young stock still growing out to maturity or slaughter, animals close to marketing condition but not meant for reproduction, castrated animals, speculation livestock etc., i.e. animals which do not contribute significantly to the herd's reproduction capacity and to which the rancher is therefore not particularly attached sentimentally or economically. The rancher can sell these fillers progressively as the drought starts to take effect and shrinks his ranch's feed supply, always taking care to sell the animals while they are still in good marketable condition. Basically, herd size and *inter alia* feed requirement is tracking the rainfall (Toulmin, 1994), but because the rancher is proactive, he is one step ahead of the decreasing feed supply.

Namibian commercial ranchers have been advised since the early days to limit livestock breeding (i.e. stud breeding) to the moister, more stable north-central and north-eastern parts of the country and concentrate on livestock raising and finishing to marketing in the more arid parts of the country (Walter and Volk, 1954). Increasing the proportion of filler animals in the total livestock herd is in line with this earlier recommendation, but allows for livestock breeding on an opportunistic basis even in the most arid zones, consistent with the most recent understanding of the ecology of arid rangelands (Westoby *et al.*, 1989). Judicious emergency sales of filler animals is encouraged by the recent changes in the meat and carcass grading systems of both Namibia and South Africa, which moved away from a grading system expressing a value judgement (e.g. "Super Grade" or Grade 1) towards a more descriptive grading system (grading classes for age of animal, fatness, carcass size and conformation), making it more profitable to market older, bigger animals. These trends would have to be encouraged in the interest of the sustainability of grass-fed meat production.

Little research has been done on ideal herd elasticity. However, in an environment as arid and unstable as Namibia's, it is probably advisable to allocate one-third of the herd's feed requirement to filler and two-thirds to breeding livestock. This proportion may vary from ranch to ranch depending on its environmental vulnerability, the economic requirements of the rancher and other drought-buffering measures taken. To be able to destock rapidly up to one-third of the long-term stocking rate of a ranch probably buys the rancher enough breathing

space to get through most of the lesser droughts. In a really severe drought, even this proactive measure will not prevent the rancher from having to apply drought crisis management.

The income earned from sacrificing filler livestock should be kept in the kitty to cover loss of income due to the drought (few animals will reproduce or be marketed), drought-induced expenses (e.g. emergency feed purchases) and, most importantly, buying livestock for restocking after the drought. Luxury expenditure should take a back seat in the interest of the financial soundness of the livestock production enterprise. Commercial ranchers will only be persuaded to destock timeously if income derived from emergency sale of livestock is not taxed as regular income, but exempted from taxation under special tax provisions. This is apparently currently under investigation (De Klerk, 2000) as part of a wider effort to create a conducive policy environment for drought management by the Namibian government.

Traditional ranchers value their livestock - and cattle in particular - far more than their economic return and often hang onto them for as long as possible until the drought destocks for them (Behnke and Scoones, 1992). They may then be forced to sell off farming and household items, seriously compromising their capacity to survive the drought and resume ranching afterwards (Devereux and Tapscott, 1993). Special incentive schemes, marketing structures and price support policies need to be set up to coax communal farmers to part with some of their livestock in time and to handle the possible overload of animals in poor condition during a drought (Holtzman and Kulibaba, 1994). At present, livestock marketing structures in communal areas in northern Namibia would not be able to cope with an increased willingness of communal ranchers to part with their cattle before a drought strikes (Kirsten *et al.*, 1999).

While timely and progressive destocking is an immediate anticipatory response, buffering the farm biologically is of a long-term nature: maintaining a realistic and flexible stocking rate, responding to temporal and spatial variation in veld productivity, and practising a suitable grazing system. Carrying capacity, stocking rate and grazing systems are contentious issues outside the scope of this article, but it seems as if maintaining a realistic stocking rate contributes much more to sustainable veld productivity than any particular grazing system (O'Connor, 1985; O'Reagain and Turner, 1992; Ash and Smith, 1996). There also seems to be a shift away from the long-recommended high performance to high utilization grazing systems even in arid areas (Bester, 1993; Earl and Jones, 1996; Bester, 1999). The most important issue is really to ensure adequate veld resting to recover from grazing and to encourage certain phenological stages (e.g. translocation of reserves) or management purposes (seeding and seedling rest). Rested veld in itself will also act as a grazing reserve and buffer the onset of a drought. Depending on the aridity of the ranch, 10-33% of the veld should be rested at any one time, in accordance with the particular grazing system applied.

Another anticipatory measure, which takes time, is to establish a fodder bank. Such a buffer may take many forms: hay harvested from cultivated dryland pastures of adapted indigenous grasses such as *Cenchrus ciliaris* or *Antheophora*

*pubescens* or from irrigated lucerne, hay made opportunistically in good seasons from wild grasses growing in cleared areas of veld or in roadside reserves, or plantations of exotic drought-resistant fodder crops such as salt bush (*Atriplex*), blue bush (*Kochia*), Mexican aloe (*Agave*) and spineless cactus (*Opuntia*), the latter bearing fruit which may also be sold profitably. Several indigenous shrubs may also have potential as cultivated fodder crops, e.g. the camphor bush (*Tarchonanthus camphoratus*) (Smit, 1999) and increased research will surely identify many other suitable indigenous plants to be used as last grazing or browsing reserve. They should preferably be established in pure stands, which are easier to manage than mixed stands and be protected from uncontrolled grazing. The rancher should have a variety of fodder crops at his disposal to ensure production at all times and 5-10% of the ranch under these crops seems to provide an adequate cushion against the effects of most droughts. Some metabolic disturbances may occur when feeding these crops as only feed, but appropriate feeding techniques and fortifiers are well known in southern Africa (Dickinson *et al.*, 1993).

All or a combination of these measures, of which increased herd elasticity is the most important, should be taken by Namibian ranchers to prepare themselves for a drought. Drought is such an integral part of the farming environment that planning for drought and drought preparedness should not be aimed at any one particular drought, but should rather be a fundamental part of livestock production in an arid country.

## DROUGHT CRISIS MANAGEMENT

Many a minor drought will be successfully negotiated merely by instituting the advance measures described above. However, during some major droughts prompt disposal of fillers (one-third of feed demand) will not be enough to offset a shrinking feed supply and the rancher will be forced to destock even more and activate different disposal priorities. Getting rid of all the non-pregnant females as well as reproductive animals which would have been marketed within the next couple of seasons anyway because of old age, poor performance, undesirable phenotype or unthriftiness will probably reduce the stocking rate to half of normal without crucially affecting the ability of the herd to reproduce up to their original number within a short time. Surplus breeding male animals (due to the shrinking number of females) should also be sold. Even some of the least promising young replacement stock should be marketed to reduce the stocking rate (or feed demand) to 40-45% of the norm, which is probably the minimum required for herd rebuilding within a reasonable time. Each time, the rancher has to estimate the present value of the animal to be disposed, the expense of keeping it through the drought and finally its expected value after the drought. The remaining animals are the nucleus of the herd; animals without which the rancher cannot do. Further destocking would seriously cripple the enterprise, as it will take too long to rebuild the herd from such low numbers. The animals sold during this phase of the drought will probably not command such a good price as the filler livestock sold earlier, because other drought-stricken producers are selling everything, the markets are glutted and the animals are already in poor condition. This underlines the importance

of prompt and judicious sales of fillers, preferably before year-end, when prices are traditionally at their peak.

Should the drought shrink the available feed supply even further, the rancher is left with no other choice but to withdraw the nucleus herd from the major portion of his ranch and feed them in a smaller camp sacrificed for the benefit of the ranch at large, or even to feed the nucleus herd in a pen. A compromise is to allow the herds restricted access for 3-4 hours/day to the veld and pen-feed them during the remainder of the day. Restricted access will prevent severe denudation of the veld but enables supplemented animals to maintain normal rumen function. From an ecological perspective it is advisable to withdraw animals from the veld before all herbaceous cover has been removed, especially on light-structured (sandy) soils and on sloping ground, to prevent massive erosion in the next rainy season. Remaining stubble will also prevent sterilisation of the topsoil by solar radiation and heat. The nucleus herd should not be left to roam around on the veld as even the greatly reduced (halved) stocking rate will far exceed the diminished carrying capacity of the veld, with all the classical problems of overgrazing. Even supplementary feeding of fodder bank crops on the veld will probably stimulate the animals to eat more, rather than less and cause serious harm to the grass sward. Sheep ranchers will have to withdraw their animals from the veld sooner than cattle ranchers, because sheep are more selective feeders capable of much greater damage to drought-stressed grasses and dwarf shrubs than non-selectively feeding cattle. Any rancher proud of the wildlife roaming his ranch should also make some kind of provision for wild herbivores during a drought.

Confining animals to a restricted space will reduce their energy expenditure and lead to more control over their feeding, while limiting access to water to every second day will decrease feed intake and assist the proper digestion of dry, fibrous feeds (Leng, 1992). All these factors will stretch the available feed resources. However, since the nucleus herd will consist mainly of lactating females with suckling young, which need better feed and water *ad lib.*, the scope for feed savings is limited. It may be preferable to maintain higher levels of production in a small herd than to hold a large herd at survival level. The accumulated fodder bank should be raided to feed the nucleus herd, as this was the purpose of its existence. Under no circumstances should animals not worth the money be fed, as they will not be able to repay this investment. Only the most healthy and valuable animals are to receive drought feed. Similarly, feed from outside sources should not be bought now, as many ranchers will be chasing limited fodder stocks whose prices will have gone through the roof. Again this emphasises the need to have done the necessary preparations and procurements in good time. An emergency feed which has proven itself in Namibia is alkali-treated ("chocolate") maize which can serve as an only feed for weeks or indefinitely if supplemented with a bit of hay (Anon., 1981).

However, penning and intensive feeding are unfamiliar situations for most ranchers used to rather more *laissez-faire* management of free-ranging livestock. It requires constant supervision of animals and daily manual feeding but results in metabolic disorders due to unfamiliar diets and surroundings

and a build-up of weakness, stress, waste and pathogens in the confined space. Impeding the reproduction of nutritionally-challenged livestock, preventative animal health, control of external and internal parasites and stress-related contagious diseases is of paramount importance, in stark contrast to a free-ranging situation. Pen feeding is a true crisis for most ranchers and should be avoided as far as possible by strategic anticipatory measures.

Advice from experts becomes crucial as lack of action or an incorrect decision today will cause losses tomorrow and will not be compensated by action taken the day after, or next week. The drought-stricken farmer is not just in need of material support by other sectors of society, but also of sound technical advice in the totally unfamiliar situation of running a feedlot, possibly without sufficient or suitable fodder. While a lot of information on drought crisis management and drought feeding is available, especially in the popular literature, it still has to be transmitted efficiently in this time of crisis. Authorities such as Leng (1992) and Gammon (1998) should be consulted to help make strategic decisions on whether to feed animals for production or survival (maintenance), various drought rations and the mechanics of pen-feeding.

## **DROUGHT AFTERCARE**

Once the drought is broken by the resumption of rains, the rancher needs to expand his enterprise as rapidly as possible to ensure financial feasibility. However, he has just reduced his means of production, sometimes severely, by destocking and his primary resource, the veld, is probably in too poor a condition to sustain expansive grazing. First priority should be to allow the veld sufficient time to recover from the effects of drought before resuming normal grazing practices, but in the hurry to recover lost earnings and satisfy livestock's hunger for fresh feed, animals are often returned to the veld too soon, prolonging the effect of drought and causing range degradation. This may result in a man-made drought, when even years with normal rainfall may be perceived as being drought years (Tainton *et al.*, 1993).

Having been forced to completely withdraw all livestock from the range, it is probably safest to wait until certain desirable indicator grasses become reproductive before resuming normal grazing. This may take a long time in an arid country where rainfall is unpredictable and scattered in both time and space, forcing the rancher to persist with restricted feeding of penned animals. Waiting until the most palatable plants are seeding and out of their very vulnerable initial growth phase will protect the individual tuft as well as bolster the depleted seed bank, ensuring the survival of the herbaceous layer (O'Connor, 1995). Significant herbaceous recovery is only possible with reduced stocking levels and normal rainfall and management policies after drought must give priority to rangeland recovery (Moyo *et al.*, 1996). Browsing livestock such as goats may be employed to restrict densification of woody plants while allowing the herbaceous plants to recover, and to bridge the gap in income between the end of the drought and restocking with grazing livestock.

Where the veld did not have to be evacuated, the initially small number of livestock available will aid veld recovery and progressive restocking will probably allow simultaneous recovery of veld condition and productivity. But the rancher must restock rapidly in order to survive. Depending on the severity of the drought, this may not be possible by merely allowing his livestock to reproduce normally and additional livestock may have to be bought in. This is the ultimate role of the accumulated financial reserves: to allow rapid restocking. However, where does the additional livestock come from? If the drought struck vast parts of the southern African region, breeding livestock will be hard to come by, extremely expensive and the rancher is forced to rely on his nucleus herd's residual reproductive capacity, so carefully protected during the drought. However, few droughts are ever this bad. Lesser droughts will have left many areas inside Namibia and other countries with their normal livestock population intact and weaners to spare. It is here that the restocking rancher should shop for new filler animals and, given the entwined regional economy and excellent transport system, get them onto his recovering veld. He can even afford to compete with the big feedlots which normally import hundreds of thousands of weaner cattle and sheep from Namibia: following the drought, feedlots would still be feeding expensive, drought-reduced grain stocks and their margin per animal will be low. This affects their purchasing power negatively, while the rancher, with recovering veld, is entering a phase of feed surplus and can afford a higher margin on livestock bought. It is vitally important that the livestock acquired must add to the elasticity of herd composition, as the destocked herd will contain disproportionately many breeding animals and no or few fillers. The destocked herd should essentially be topped up with fillers, whereas only those ranchers who had to evacuate their veld need to buy a sizeable proportion of breeding females. Herd composition needs to remain flexible so that destocking can occur as rapidly as restocking.

Before restocking, the rancher should re-evaluate his production system. Is it really suited to his environment? Should he not perhaps change to a different production system? These decisions might influence the type of livestock he buys in for restocking. The rancher should also reconsider his farm's baseline resources: the soil, the vegetation and his livestock. In what condition did they emerge from the drought and what can he do to aid their recovery or adaptiveness? Can the ranch and its sources of income be diversified to spread the risk and reduce vulnerability to drought? Questions of such philosophical nature will have to be faced honestly, since self-deception will only worsen the rancher's situation. Options that should increasingly be utilised are negotiated access to emergency grazing leased from other ranchers. In our brittle, rapidly changing environment, it is not good to be bound to one place; man and beast should be mobile, as indicated by the time-honoured traditional ranching methods of communal farmers. Once again, to be really attractive, these options need a conducive policy environment created by government, rather than direct drought subsidies. However, the nature of such policies is not within the scope of this article.

The Namibian rancher has no choice but to graze his livestock in an arid, drought-prone part of Africa. Droughts occur

frequently and have the power to ruin even the best prepared rancher, let alone an unprepared optimist. Coping with drought requires its own peculiar rules of engagement: certain anticipatory measures and a timely response to early warning will assist the rancher in avoiding the worst effects of a drought most of the time. Even in the midst of a severe drought, certain management practices will contribute more to survival than

others. After the drought, it is time for the primary resources to recover and to be followed by accelerated livestock production after an adequate lag period. Advantage is to be taken of the good years to cater for the demands of the tough years. It is a perpetual cycle of boom and gloom but much better than a terminal boom and bust.

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