Regenerating Namibia's Livestock Farmers

Farmers' approaches and tips towards improving resilience to droughts, production per hectare and profitability

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The NAU would like to thank the farmers for making their time and farms available for the study, and for openly and willingly sharing their information, their successes and their challenges included in this booklet.

The case studies presented in this booklet have been developed by innovative farmers, who have applied the outlined practices to their specific circumstances. Each farm has its own unique characteristics and farmers must be sure to evaluate the applicability of these practices to their farm to ensure improved resilience, production and profitability. The NAU does not necessarily endorse all mentioned management aspects as absolute, because environmental conditions, personalities and individual situations vary greatly. Rather, the farmer should consider them as guidelines towards developing a workable approach for each unique situation.

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Introduction

This booklet is a summary of a selection of Namibian farmers' practices and methods as well as tips for increasing their production and profit per hectare and for increasing their resilience to drought. Although some practices do not cost any money at all, others are expensive and need careful consideration. Once you understand the changes, some are easy to make but others are harder and require a high level of effort. Making a positive change creates exceptional opportunities for the next generation to start their own enterprises that are complementary to the existing practices on the farm.

Fifteen key tips for achieving success

The following fifteen key tips for increasing production and profit per hectare and achieving success were selected from the case studies: (For complete case studies and additional information visit www.nau.com.na)

- 1. Assess the potential of your land and allocate different enterprises to the different soil potentials. Over time, make sure that the potential of your farm is realised in a profitable manner.
- 2. Choose a regenerative grazing approach that suits you. Make sure your choice is appropriate for the amount of time you have available to spend on rangeland management and that it takes into account the severity of the predator problems on your farm. There are a number of grazing practices that will work with your existing infrastructure; however, careful planning and implementation is required. It is therefore wise to consider investing in an expert, someone who knows the approach, in order to help you with starting correctly. Change can be expensive if it is not planned and phased in carefully.
- 3. You need to understand whether any major interventions such as bush control and keeping water on your land are necessary and whether they are profitable, or whether changing your grazing approach (e.g. combining herds) is adequate.
- 4. Once you have selected an approach, do not try and manage your entire farm with limited livestock numbers. Always start your management approach with your best camps (i.e. those that will provide the best animal performance at the lowest cost), and then deal with the other camps at a later stage, when you have

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enough livestock. There is a lot that can be done that does not cost money: do what you can now, with what you have.

- 5. Always remember: When the animals are present in a camp, the focus must be on animal performance; when the animals are out of a camp, the focus must be on the rest/recovery of the camp. If your wildlife numbers are high and spread all over the farm, then your rangeland management efforts will not succeed. If wildlife is not your main income source, you will need to reduce their numbers.
- 6. If you have established that bush control is necessary, it is vital that you only apply it to as much bush each year as you have livestock to utilise the extra grass and shrub growth effectively. Your choice of method will be determined by the severity of frost (which controls after-growth) and the aggressiveness of the bush regrowth in your area.
- 7. Assess your farm to determine how much browse and grass is available now and how much will be available after bush-thinning for the animals. This will determine whether you should consider a combination of animals (browsers and grazers) that utilises as many levels of the available forage as possible. Plan for the adequate number of livestock to keep this extra growth stimulated. This stacking increases your stocking rate and production per hectare and ensures that the bush is being effectively utilised, which means you are making money out of it. It is vital to note that as biodiversity increases, your production and quality of forage will also increase. As such, you do not want a monostand of grass.





A monostand of grass will reduce your resilience to drought.

- 8. Your choice of grazing approach and the available bush and grass (or that you expect to be available after bush control) will enable you to choose the types of animals best suited for the farm's conditions. All chosen animal types need to be low input, early maturing and adapted to your available forage. Use low maintenance bulls that give calves that are weaned at 50% of the cows' weight. Select animals based on economic criteria. Remember, smaller cows can provide an increase in the stocking rate per hectare.
- 9. Buy animals that have been managed in a similar way to yours, from as close to your area as possible as they will adapt to your conditions the fastest. The best adapted animals are those born on your farm. When you have enough cows (200 or more), you can consider closing your herd.
- 10. Every day, check that the animals are full and that their dung has a healthy appearance. This ensures good animal performance and good fertility. If your grazing approach is improving your stocking rate and you are achieving good animal performance at a low cost, then your production and profit per hectare will increase over time.
- 11. Be careful not to increase the stocking rate too far on the current state of the veld. As the stocking rate increases, so does production, but at a slower rate. If you increase the stocking rate too far, your production per hectare goes down and your costs go up, because you have more animals. In this scenario, you will lose money by having a higher stocking rate. You need to aim for the optimum stocking rate appropriate for your current resource base, where production per hectare is maximised. Good production must always be from the veld (and when needed supported by lick); it cannot be obtained through supplementation. Do not chase high stocking rates if you are not getting good production from the veld.
- 12. Plan for drought resilience starting again after every drought is not sustainable. Building your soil through a regenerative grazing



plan is the main way to build resilience to drought. Always keep a drought reserve of one or two years' worth, depending on your conditions. Choose a production system that suits your conditions. In an ox production system, the cow herd is 40% of the total; and in a cow-calf operation, the cow herd is 66% of the herd, which is more difficult to sell in a drought.

- 13. Most importantly, when you determine a forage shortage, destock early (or do not buy in speculation animals) to enable your core herd to be taken through to the next rainfall period.
- 14. Be on the land and observe what is happening with regards to planned or unplanned events. Assess the results. If positive results are observed, test this action on a larger portion of the farm and decide what to do. Be on the land with your animals as often as possible, so that you know what is going on and, where needed, adjust accordingly.
- 15. Keep learning from your farm as well as from what others are doing. Keep up to date with this fast-moving, farmer-driven regeneration process.

To apply these fifteen tips, you will need to:

- acquire a vision of where you want to go;
- develop a detailed plan, with a five-year cash flow and profit projection as well as an annual budget that you stick to;
- develop and stick to a weekly, monthly and annual plan of activities;
- control unnecessary costs so that you can invest excess money in wealth-generating expenses, for example, if your animal numbers are low, buy a cheaper car and buy cows instead;
- remember, a 5% increase in income (better production or price) will achieve the same as a 10% decrease in costs – do not cut out key production supporting costs to make more money, because you will lose money; and
- keep a record of the key factors that enable you to judge your success effectively.

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How to determine your production and efficiency

What is the '20% that makes the 80% difference' to optimise profitability of livestock production? As farmers, what are the key levers we can use to make the biggest impact on profit? It is important to know how to determine your success in livestock production. Profit is generated by optimising income while keeping expenses under control. The levers of income in livestock production are threefold:

Income/ha = Stocking rate/ha (1) X production efficiency (2) X price/kg (3)

The art of optimising livestock income is finding a balance between maximising a sustainable stocking rate per hectare while ensuring production efficiency is kept at optimum levels (constantly adapting according to the available resources on the farm).

Lever 1:

The stocking rate is the main profit driver.

An increase in the stocking rate results in increased production per hectare.

The stocking rate/ha is defined as: The total live weight of the herd (on average throughout the year) divided by the total hectares of the land.

Lever 2:

Production efficiency measures the effectiveness of converting the available grass and edible bush on the farm to a sellable product (livestock weight).

Production efficiency is calculated as follows:

Production efficiency = kilogram live weight/ha produced as a percentage of stocking rate/ha.

Production efficiency is mostly affected by fertility of the herd (% calves and lambs weaned as % of cows and ewes mated); the herd composition; and the kilogram growth of the animals per annum. Benchmark figures differ with different production systems (i.e. weaner production, $\pm 32\%$; cow-ox production, $\pm 37\%$; and growing out weaners to oxen, $\pm 45\%$), and the production efficiency of sheep is higher than cattle.

Kilogram live weight produced per hectare: To calculate the annual yield on the farm, only three figures are required once a year.

- i. What is the mass of the livestock herd at the end of the production year? (normally at the end of the financial year)
- ii. What is the total kilogram live weight that was sold from the farm in the year?
- iii. What is the total kilogram live weight that was bought or arrived on the farm?

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Therefore:

Production/ha = mass of the livestock herd at the end of the year – mass of the livestock herd at the beginning of the year – kilogram live weight bought for the year + kilogram live weight sold for the year

Lever 3:

Price/kg

As producers are price takers in the market, they have little influence on the market price. However, deciding on when to market in the year and what types of products are marketed can have an influence on maximising the price realised per kilogram live weight. To keep expenses under control, most of the case studies indicate that the female herd should be early maturing with early fat deposition, and adapted to the management system, rangeland condition and forage quality on the farm. An adapted herd requires minimum additional input and less additional lick for the maintenance of body condition. **Selection for the genetic ability to gain fat early** and the ability to quickly recover body condition after weaning should be prioritised. The Body Condition Score is medium heritable (±30%) and genetic progress can be achieved.



* See page 50 for an example to help you to calculate your own production and efficiency and profitability.

Improving your soil

The stocking rate of your farm is the total kilograms (live weight) of all the animals on the farm, divided by the total number of hectares that these animals use on the farm. The stocking density indicates how bunched together these animals are. So, two farms can have the same stocking rate (i.e. the same number of animals per hectare throughout the entire farm). However, if one farmer combines several herds into one or two herds, then there will be more animals in a camp compared with the other farmer. The farmer who has combined herds has a higher density of animals but the stocking rate may be the same. If you apply the same rangeland management and increase the stocking rate, animal production per hectare decreases; and as the stocking density increases, competition for forage increases and animal performance per hectare declines. However, combining herds together allows for better rangeland management as the plants are given time to recover before being utilised once more. The amount of time needed for plants to recover and establish after being grazed or browsed depends on how severely they were grazed and their growth rates. This treatment of the rangeland allows for the re-establishment of good perennial grasses, shrubs, forbs and bushes. As a result, sustainable stocking increases without losses in animal performance and animal production.

For your grazing plan, it is important to consider the impact of keeping forage plants in a vegetative growing phase, as this gives good-quality forage to the animals and stimulates plant growth. According to Dr Christine Jones (Amazing *Carbon*) it is during this growing stage that the plant feeds the soil the most, where approximately 40% of the carbon gathered through photosynthesis goes into above-ground plant growth, 40% into below-ground plant growth, and 20% is pumped into the soil for the microbes (see Diagram 1).

It is important to continue feeding the microbes in the soil while you make money out of good animal performance. As this feeding process continues, more soil structure is built, the water-holding capacity of the soil improves, and more nutrients become available to the plants. How your plants are grazed has a profound effect on how much sugar is pumped into the soil, and it determines whether the forage plants are stimulated or killed over time. A late growing-season rest is particularly important because this is the time of main root development and seed set development to restore the seedbank. Once grass plants begin to form seeds, they no longer feed the soil as they focus on seed production instead. With a good grazing plan, you want to see an increase in

BUILDING HEALTHY SOIL SOLVES EVERYTHING! PLANTS GROW BY MAKING **CARBOHYDRATES** (sugars) FROM CARBON DIOXIDE (CO2) AND WATER (H2O). THEY SHARE THESE SUGARS WITH SOIL MICROBES WHO, IN EXCHANGE, FEED THE PLANT. THIS PROCESS BUILDS SOIL.

NEDALS

WATER

te plant, incre

acity x200

MYCORRHIZAL FUNGI attach BACTERIAL COLONIES to the roots to be fed and in return give nutrients - wate es break dow MYCORRHIZAL AGGREGATES BACTERIA ACCREGATES and soil a HEALTHY SOIL IS FULL OF CARBON BASED SOIL

AGGREGATES AND SOIL LIFE. HEALTHY SOIL: UNHEALTHY (DEAD) SOIL:

Diagram 1: Building healthy soil. 40% of the carbon gathered through photosynthesis goes into above-ground plant growth, 40% into belowground plant growth, and 20% is pumped into the soil for the microbes.

biodiversity, an increase in soil cover, greener plants into the winter, and greener plants before the rains come.

An initial step has been taken with regards to investigating the impact of each grazing approach on the liquid-carbon pathway (see Table 1). With the knowledge of the liquid-carbon pathway, you can adjust your moves within each of the approaches to fine-tune your grazing to increase your sustainable stocking rate, with good animal performance and money in your pocket.

RELATIVE IMPORTANCE OF THE KEY DRIVERS OF LIVESTOCK PROFITABILITY (8x, 4x, 2x, 1x)



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4. achieving good animal fertility and

3. ensuring good animal perfor-

 selecting low-input, well-adapted animalsfor yourfarm's conditions; AND

1. improving your resource base to hold

lf you are:

more animals on the farm; AND

Profit per hectare

mance; AND

weaning rates; THEN

YOU ARE MAKING MONEY!

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Chlo stor bride to the		
	Your choice of regenerative graz- ing plan as well as bush control	 Animal fertility is determined, to a large extent, by animal condition,
Increasing the number of animals that your farm can sustain-	inetiou (in needed) winnave an impact on your choice of animal/s for utilisation of the forage that	a rising plane of nutrition, and sexually-transmitted diseases.
ably hold is the most important driver of livestock profits. To achieve an increase in custainable stocking rates the	your farm produces.	Fredators play a big role in the reduction of weaning rates. The effec-
following five criteria need to be considered:	Remember: Green edible plants = money	tive control of losses due to predators is vital, particularly with calves,
Select a regenerative grazing approach that suits your	You must have the right types and combinations of animals to	lambs and small stock.
circumstances. (see Table 1 to assist with this decision).	properly utilise the green (grass	Some grazing approaches are more susceptible to predators than
If you need to execute bush control, your grazing	and browse) that you have on the farm.	others (see Table 1).
approach must suit the aggressiveness and degree of regrowth of the bush. (See case studies)	The animals selected for your	
Decide whether vou need to implement landscape	farm must be adapted to your farm's conditions. The more	Animal performance (2x)
rehydration practices to keep water on the land.	adapted the animals are, the	To achieve good animal performance, it is not only important to man-
The grazing plan needs to consider: keeping forage	ress they cost to produce and the greater your profit. Your choice of	age the animals' general health and nutrition but also to manage the
plants in a vegetative growing phase to build soil carbon;	ănimal has a big impact on animal	nealth of their rumons.
late growing season rest to enable root development	performance and fertility, which are kev drivers of profit.	 As the further contains different microbes that use different types of food, it takes more than one week for the rumen to adjust from one
and seeding; non-growing season animal impact on	Choose carefully. Ideally, aim	food type to another (i.e. a diet of largely grass seed heads changing
harder soils (take care on sandy soils).	for low-input, early-maturing	to a diet of mainly grass stalks). During this time period of change,
With a good grazing plan, we want to see an increase	animals with good feed conver- sion ratios and a frame size that	animal performance is poor.
in biodiversity, an increase in soil cover, more greener	best suits the resource base on	 For your grazing plan, it is therefore important to try to keep the animals' along of automics or stable or accelela Along to the second se second second se
plants into the winter and before the rains come.	your farm. If you are weaning	animals plane of nucleon as stable as possible. Also, if you provide supplements only on the weekend, make sure the supply lasts until
This all saves money and ensures good animal performance	calves at approximately 50% of the cows' weight. then vou have	the next. If this continuity is not maintained, you upset the rumen
at no extra cost. If this continues for several years, your	animals of the right frame size	by forcing it to constantly change and re-adjust, which results in the
soil health will improve resulting in increased production,	and suited for your conditions.	loss of money.
Increased quality of forage and increased resilience to	In your grazing plan, remember to take account of the current	 The rumen is also affected by water quality and changes in its pH (acidity) Operation has visibly lost condition it means that over 20
the profit per ha in the centre will increase. If you achieve	game numbers. If high game	kactarry). Once a cownas visitory fost contantion, it interans that over 70 kg have already been lost. To regain this loss is expensive.
this vou have established the platform for the future suc-	numbers throughout the entire farm are not managed volur	• To check whether the animals' rumens are functioning effectively,
cess of the livestock enterprise.	grazing plan will not yield results.	inspect them every day to ensure that the triangle on the top left-
The 16 case studies included in this booklet share how farmers h	s have managed to increase their	hand side between the rump and spine is full and rounded and that the dung is soft with a noticeable indented dimple.
sustainable stocking rates and their resilience to drought while m	maintaining good animal perfor-	A number of animal health issues exist, particularly pest-related
mance and fertility.		issues, which vary from place to place. An appropriate grazing plan
Table 1 provides the pros and cons of all the grazing approaches i	s included in the case studies.	can prevent many of these health issues by breaking the life cycles of pests. which reduces or eliminates the need to dip or treat. Healthier
lable 2 provides a summary of all 16 case studies, from which you interests.	ou can select a study that hts your	forage means a heathier animal and less disease.

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Table 1: Grazing Matrix of the case study farms' grazing approaches and their impacts

Grazing approach	Derivatives	Underlying principles	
Multi-camp farm with herds of animals in most camps.	Many variations that have caused many of the rangeland issues we have today.	Too many herds at high stocking rates results in continuous grazing near water points and in favoured areas (selective overgrazing). Over-rest occurs far from the water points. Rest/recovery: Not planned Drought reserve: Not planned Fire: Not planned Animal impact: Minimal Compatibility with game/small stock: High Impact of drought: High	
4- or 8-camp flexible rotation with few herds; planned moves at a relatively LOW stocking rate.		This approach focuses on animal performance, relatively LOW stocking rates and the stimulation of palatable species (the unpalatable species die-off due to under-utilisation). Rest/recovery: Planned, based on rotation and lick intake and plant species (shrubs and grasses). Drought reserve: Planned: one season's reserve forage (low stocking rate). Fire: Farm Agagia excludes fire; Farm Dabis (East) uses fire to control regrowth. Animal impact: Minimal Compatibility with game/small stock: Compatible at low numbers. Impact of drought: Low	
Split Ranch Approach	Riaan Dames Approach	One full season's rest every second year compensates for the high utilisation during the year of use. Animal performance is maintained by keeping grazed half of farm in a high-quality (short) growth phase. Rest/recovery: Excellent; half of the farm receives a 12-month rest period every second year. Drought reserve: Available: separate camps or within the grazing approach. Fire: Chequerboard grazing approach limits fire. Animal impact: Moderate to high Compatibility with game/small stock: Compatible Impact of drought: Good fodder flow is in place to enable early destocking.	
Mara Approach	Fodder Bank	Perennial grasses benefit the most from two consecutive growing season rest periods. The camps being utilised in a given year can also be rotated using various methods. During the two-season rest period, grasses can establish and produce seed before being grazed. All camps are grazed during the non-growing season. Animal performance is maintained by enabling selection. Rest/recovery: Excellent; a third of the farm receives a 16-month rest period every third year. Drought reserve: Available: in separate camps or throughout the entire farm. Fire: Excluded Animal impact: Moderate to high Compatibility with game/small stock: Compatible Impact of drought: Good fodder flow is in place to enable early destocking.	
Holistic Planned Grazing with adequate recovery; animal impact can maintain soil cover and keep forage plants healthy and more productive.	Multi-camp with few herds; selective utilisation; 2-year rain independent recovery period.	This approach is best suited for dwarf shrubland. It utilises a 2-year rain-independent recovery period for dwarf shrublands before being grazed once more. Rest/recovery: Good; relatively high grazing intensity with 2-year recovery period. Drought reserve: Planned: 2-year recovery period. Fire: Excluded Animal impact: Relatively: High Compatibility with game/small stock: Good in low numbers. Impact of drought: Very drought resilient, but de-stocking of animals is required when forage shortages are detected.	

Management and infrastructure required	Liquid-carbon pathway (LCP); root establishment	Pros and cons	Relevant case study farms
Low management demand; existing infrastructure is usually used as is.	Negative impact on the liquid- carbon pathway and root development of palatable plants; the over-utilised plants die.	Advantages 1. Little management is needed and routines are established. 2. The animals perform well. Disadvantages Although the animals perform well: 1. Degradation of the veld occurs as too many herds per camp prevent the rest and recovery of key forage species. 2. Degradation reduces the animal numbers.	Most of the case study farms used this approach in the past but changed once they realised they needed to find a better way, not only to survive but also to prosper.
The farmer must be present in the veld, must follow the usual rotation, and must be flexible to decide when to move sooner or later, depending on the use of key plant species (indicators). Basic 4- or 8-camp infrastructure is required.	Improved impact on the liquid- carbon pathway and root Advantages Fa development of palatable plants. 1. Easy to manage. 2. Low input costs. Fa 3. Good animal production and fertility 4. Good drought resilience 5. Maintains good cover. Disadvantages 1. Requires the farmer to be knowledgeable about what the animals eat and the right time to move to the next camp. This grazing approach stimulates the Advantages		Farm Agagia Farm Dabis (East)
Moderate management is required. Infrastructure is required.	This grazing approach stimulates the liquid-carbon pathway during the year the animals spend in the camp because the plants are stimulated and their growth and quality are maintained. During the year that the camps are rested, the liquid-carbon pathway is not that active but good root development and seed set take place.	Advantages 1. Low input. 2. Easy management. 3. Good animal performance and good regeneration. Disadvantages 1. Not that good for restoring annual veld.	Farm Molly Farm Hessen
Low management demand. Moderate infrastructure is required (for camps not bigger than 150 ha).	This approach stimulates the liquid-carbon pathway when the animals are present in a camp, and it allows for the long recovery of root development and seed set.	Advantages 1. Low input. 2. Routines are established and easily followed. 3. Fodder flow planning is possible because only one third of the camps are utilised for the first 5 months of the year. Disadvantages 1. Lack of available biomass in camps that are utilised during winter and again in the following growing season, especially with insufficient rain during October-December. Note: This can be managed.	Farm Donkerbos
Very low level of management. Relatively high investment in camp infrastructure.	Good stimulation of the liquid- carbon pathway while the animals are present in the camp. Root development and seed set take preference.	Advantages 1. Easy to manage. 2. Good regeneration and good animal performance. 3. Increase in sustainable stocking rate. 4. Reduced theft and predator problems. Disadvantages High infrastructure costs (if electric fences and mobile water points are not used).	Farm Dabis (South)

Table 1: Grazing Matrix continued

Grazing approach	Derivatives	Underlying principles	
	Multi-camp with few herds; high utilisation	This approach focuses on veld improvement. Animal impact is required to improve the resource base and long recovery periods are planned.	
	periods.	Rest/recovery: Excellent; high grazing intensities with long recovery periods.	
	P	Drought reserve: Planned: remaining forage in all camps.	
		Fire: Excluded	
		Animal impact: High	
		Compatibility with game/small stock: High	
		Impact of drought: Fast destocking of animals is required when forage shortages are detected or impacts	
	Multi-camp with	are severe. This approach focuses on animal performance, but fewer berds and higher density ensures better	┝
	few herds: selective	recovery and the stimulation of good forage plants. Start with the best camps and improve these. When	
	utilisation; and	animal numbers increase, then include more camps.	
Holistic Planned	relatively short		
Grazing	recovery periods	Rest/recovery: Good; low grazing intensity relatively short recovery periods.	
Grazing with	(lan Mitchell Innes	Drought reserve: Planned: remaining forage in all camps.	
adequate recovery.	approach).	Fire: Excluded	
animal impact can		Animal impact: Relatively high.	
maintain soil cover		Compatibility with game/small stock: Good in low numbers.	
and keep forage		Impact of drought: Fast destocking of animals is required when forage shortages are detected or impacts	
plants healthy and more productive.		are severe.	
	Ultra-high Density	Ultra-high density grazing reduces selection. The animal impact is high and the resource base	┢
	Grazing	recovers fast.	
		Rest/recovery: Excellent; very high grazing intensities with long recovery periods.	
		Drought reserve: Possible: in separate camps or throughout all camps.	
		Fire: Excluded	
		Animal impact: Very high	
		Compatibility with game/small stock: Compatible	
		are severe.	
	Planned Grazing and Herding	No fences are required. Herders control the grazing density and frequency on a daily basis.	
		Rest/recovery: Planned; flexible (depending on situation and need); fast moves in the wet season to ensure good stimulation of plants are required.	
		Drought reserve: Planned: remaining forage in all camps.	
		Fire: Excluded	
		Animal impact: Flexible but generally high.	
		Compatibility with game/small stock: Compatible with game and predators.	
		are severe.	
Managing for high production and	Paul Kotze Method	First, address the encroaching species to enable grass growth. Then, in the wet season, move big herds through all the camps to keep moisture in the soil. In the dry season, graze the annual grass	
high-quality annual grasses.		until it is bare, or bale the remainder to build up a 3-year forage reserve for the next drought. This approach stimulates suurgras (<i>Schmidtia kalahariensis</i>) production.	
		Rest/recovery: Good, with fast moves in the wet season.	
		Drought reserve: Very low.	
		Fire: Used to control some encroaching species (i.e. Driedoring – Rhigozum trichotomum).	
		Animal impact: High	
		Compatibility with game/small stock: Compatible	
		Impact of drought: High, unless 3 years' worth of stored forage is available.	

	Management and infrastructure	Liquid-carbon pathway (LCP); root	Pros and cons	Relevant case study
	required	establishment		farms
	A high level of management is	Heavy grazing initially stimulates	Advantages	Farm Hamburg
	required.	the liquid-carbon pathway, but long	1. Even distribution and utilisation of nutrients.	
		recoveries allow seeding early on,	2. Increase in sustainable stocking rate.	
	Infrastructure requirement is very	which stops the LCP.	3. Reduced theft and predator problems.	
	high, unless electric fences and		Disadvantages	
	mobile water points are used.	Root development is encouraged by long recovery periods.	1. High infrastructure costs; animal performance can be problematic.	
			2. Long recovery periods lead to poor quality forage.	
			3. High-density grazing on sandy soils in the dry	
			season is problematic.	
	A high level of management is	This grazing approach stimulates	Advantages	Farm Pommernhagen
	required.	the plants are stimulated and their	I. Good regeneration and average to good animal performance.	Farm Buffelhoek
	Infrastructure requirement is medium to high, unless portable	growth and quality are utilized & maintained.	 Even distribution and utilisation of nutrients. Increase in sustainable stocking rate. 	Farm Witpan
	electric fences and mobile water		4. Reduced theft and predator problems.	Farm Venus
	points used.	Root development takes place after	Reduced risk of to low fodder production/ availability in Dryer rain years	Farm Tsuwandes
			Disadvantages	(Recommended for Farm
			1. High infrastructure costs (if electric fences and	Blystroom)
			2 Lower-density grazing in sandy soils in the dry	
			season is preferable.	
	A very high level of management	The liquid-carbon pathway is	Advantages	Farm Tokat
	is required: moving fences several	stimulated when first grazed, but the	1. Even distribution and utilisation of nutrients.	
	times a day; supervising the	long recovery periods result in early	2. Increase in sustainable stocking rate.	
	operation on a daily basis.	seed set, which slows the LCP.	3. Reduced theft.	
		Root development and seed set is	Disadvantages	
		good.	1. High infrastructure costs (if electric fences and	
			mobile water points are not used).	
			2. High management costs.	
			3. Animal performance is an issue if adapted animals	
			are not used; rumen supplements may be required.	
			4. Fight animal impact in sandy soils needs careful	
_	Very high level of management	The liquid-carbon pathway is	Advantages	Farm Krumhuk
	is required: herding stock daily;	stimulated by high-density grazing,	1. Even distribution and utilisation of nutrients.	
	supervising the operation on a daily	but the ongoing effect depends on	2. Increase in sustainable stocking rate.	
	basis.	the grazing plan. It can, however, be	3. Reduced theft and predator losses.	
		used to keep the plants growing and	Disadvantages	
		Boot establishment occurs after	1. Additional water supplies and water infrastructure	
		flowering at the end of the season	modifications are required.	
			2. Herder training and management is required.	
			otherwise it is difficult to retain herders.	
	High management demand.	The liquid-carbon pathway is	Advantages	Farm Adrianople
		stimulated by the big moving herds	1. Good quality and quantity of forage is maintained	
	High infrastructure and equipment	after the rains.	in good and below average years.	
	requirements.	Root development is not of	2. Although high monetary inputs are required	
		annual grass.	stored) affords peace of mind during difficult times.	
			3. Rapid growth in livestock numbers quickly offset	
			the initial capital outlay.	
			Disadvantages	
			 High capital investment required to prepare the veld for baling. 	
			2. Low veld resilience as there is no build-up of	
			perennial grasses.	

The way forward

The way forward looks at how farmers can assess their current farming operations and how to make financially, socially and environmentally sound decisions to improve the productivity and profitability of their farms.

The NAU will host the entire, detailed case studies of the 16 farms included in this booklet on their website (https://www.nau.com. na/). The website will be further developed to include background information and links, as well as additional guidance for farmers.

The NAU, with funding from FeedMaster and Africa Cimate Foundation, is developing an approach to assist farmers with

their cost assessments for the transition to one or more of the key practices outlined in the case studies. This will result in a proposed bankable business plan, which will include estimated expected costs, and forecasted turnovers and cash flow. Although this process is still underway, it is intended to include the following steps:

- 1. The farmers will develop their own case study. The farmers will need to answer a series of key questions (based on a template similar to the one used for the case studies in this booklet) and calculate various aspects going back in time. The key questions will focus on current rangeland management, current fertility, current predator losses, current animal performance, current animal choice, current bush density, the extent of bare ground, a description of the vegetation (bush/ grass balance and density), the presence of dongas, and water flow. This process will provide a starting point and it will help the farmers to identify which key factor/s they would like to address.
- 2. This collected information will result in a status report, from which the farmer can then decide on the key issues that need to be addressed to increase production and profitability.
- 3. These **key issues are then prioritised and costed**. As the farmer works through the process, a combination of options can be selected and evaluated against one another based on their contribution to the success of the farm. The key options will most likely include:
 - Deciding which grazing approach to use.
 - Deciding whether bush control is needed;

and if, which method and at what scale?

- Deciding whether keeping water on the land is a key issue; and if, which method and at what scale?
- Deciding which animal combinations are best suited to the farm's conditions.
- Deciding which production system to use.
- 4. The farmer will then **determine funding options:** which actions can be self-funded and which need to be funded through a loan.
- 5. Following this, a **detailed business plan and implementation plan** can be developed with the farmer.



Approaches and successes

The case studies include varied rangeland management approaches. Farmers use cattle and/or small stock as a main enterprise and many have game as well. Some farmers bale hay from planted pastures or from the veld, others plant cover crops grazed by livestock and alternate with cash crops. Some combine their approach with various bush control or landscape rehydration methods. Many use invader bush as a resource to help pay for the transition to one of the four key innovations responsible for their success.

Table 2 is a summary of all 16 case studies, from which you can select a study that fits your circumstances.

The case studies include a wide range of successes. Highlights of these successes include the following:

- The choice of grazing approach that suits the needs and which enables improved and resilient stocking rates, even during the drought period in 2019.
- Unravelling the challenge of sandy soils and how best to manage them by applying animals at high density in the wet season and low density in the dry season.
- Innovative, rainfall-independent solutions for recovery periods (particularly for the southern regions).
- Innovative ways of dealing with bush encroachment, where

some farmers have decided to make money out of re-sprouting bush rather than trying to get rid of it.

- The choice of animal combinations that have resulted in a twoto threefold increase in stocking rates, with limited destocking required during the 2019 drought.
- Lambing percentages in excess of 150% and calving percentages above 80%.
- Weaning calves that are 50% of the weight of the cows that produced them.
- The effective management of predator problems by combining different methods such as electric fencing, kraaling at night, guard dogs, and herding.
- Selection of early-maturing animals, from the area, that gain weight fast.
- Increased biodiversity, increased forage production, and increased greening into the dry season.
- Reduced lick costs as well as other input costs.
- The successful application of management approaches suitable for part-time farmers.

These farmers are examples of true leaders in this field, and with the courage of their convictions they have pursued new solutions for some of the most challenging problems that Namibia faces.



Table 2: Case study descriptions in terms of management, enterprise, innovation, rainfall and size

Description	Central T	hornveld	N	Northern Thornveld			Central Sandveld / Kalk	
Case Study	1 Buffelhoek	2 Agagia	3 Venus	4 Hamburg	5 Blystroom	6 Pommernhagen	7 Hessen	
Page Number	18	20	22	24	26	28	30	
Part-time/Full-time Management	Full-time	Full-time	Full-time	Full-time	Full-time	Full-time	Part-time (Resettlement farm)	
Enterprise								
Cattle	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	 ✓ 	\checkmark	
Sheep and/or goats	\checkmark	×	x	x	×	\checkmark	\checkmark	
Wildlife and/or tourism	 ✓ 	×	 Image: A start of the start of	\checkmark	\checkmark	 ✓ 	×	
Planted pasture	x	×	\checkmark	\checkmark	\checkmark	×	×	
Baling grass	 ✓ 	×	\checkmark	\checkmark	\checkmark	×	×	
Cover crop	x	×	\checkmark	x	x	×	×	
Silage production	×	×	\checkmark	×	×	×	×	
Cash crop	×	×	\checkmark	×	\checkmark	×	×	
Charcoal or bush use	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	×	×	
Organic	x	×	x	x	×	×	×	
Key Innovations								
Grazing innovation	High density selective	Low density selective	High density selective	High density non- selective	Low density selective	High density selective	Split Ranch Approach	
Bush control	Bush-roller	Aerial with manual, selective follow-up	Removal of bush for fields (pastures)	Aerial and selective hand application	Manual	×	×	
Slowing rainwater runoff (bush filters, leaky filters, swales)	×	×	×	×	×	×	×	
No-till cropping and cover cropping	x	×	✓	×	×	×	×	
Diversification	Charcoal, roller hire	×	Tourism, charcoal	×	×	3C	Horticulture	
Average Annual Rainfall								
<250 mm								
250 to 350mm		320				250	240	
350-500 mm	428				450			
>500 mm			511	524				
Dryland	\checkmark				\checkmark	\checkmark		
Irrigated								
Property Size (hectares)								
<500								
501-2000			\checkmark				\checkmark	
2001-5000	\checkmark					✓		
5001-7500				\checkmark	\checkmark			
7501- 10 000		\checkmark						
10 001 - 20 000								

Eastern Sandveld				Highland Thornveld	Mopane Thornveld	South Dwarfshrub Savannah & Kalahari Sandv		
8 Molly	9 Donkerbos	10 Tokat	11 Dabis (East)	12 Krumhuk	13 Tsuwandes	14 Dabis (South)	15 Witpan	16 Adrianople
32	34	36	38	40	42	44	46	48
Full-time	Part-time	Full-time	Full-time	Full-time	Full-time	Full-time	Full-time	Full-time
 ✓ 	✓	✓	✓	✓	 ✓ 	✓	✓	✓
×	×	×	×	PLANNED	\checkmark	\checkmark	\checkmark	\checkmark
\checkmark	\checkmark	×	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
×	×	\checkmark	×	×	×	×	×	×
×	×	\checkmark	×	\checkmark	×	×	×	\checkmark
×	\checkmark	×	×	×	×	×	×	×
×	×	×	×	×	×	×	×	×
×	×	×	×	Vegetables	×	×	×	×
×	\checkmark	×	×	PLANNED	×	×	\checkmark	\checkmark
×	×	\checkmark	×	\checkmark	\checkmark	\checkmark	×	×
Split Ranch Approach	Mara Approach	Ultra-high density, non- selective	Low density selective	Planned grazing and combined herding	High density, fast moves in rainfall period, selective	Rain independent long recovery periods, selective	High density selective	High density selective
Minimal	In parts	None in veld	Aerial and fire	Planned	×	×	In parts	Manual removal of stumps
×	×	×	×	\checkmark	\checkmark	Planned	×	×
×	×	×	×	×	×	×	×	×
Wood	x	x	×	Tourism, added value to dairy, meat, etc.	Planned	×	x	Charcoal
					200	150	230	230
 365	380	480	433	427	290			
505	500	100	-155	127				
	~				✓			
		\checkmark	\checkmark	\checkmark			\checkmark	\checkmark
\checkmark								
						\checkmark		

CASE STUDY SUMMARY Farm Buffelhoek: Bush roller with high density grazing, cattle and sheep



Koos and Timo Briedenhann have shifted from farming with grass to farming with both bush and grass. On this farm, good browse bush is worth its weight in gold. If good quality browse is made available, the cattle and sheep will utilise it and perform very well at low costs.

FARM FACTS

DESCRIPTION: Central Thornveld.

ENTERPRISE: Well-adapted cattle and sheep in bush-encroached areas.

PROPERTY SIZE: 5011 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Moderate to severe bush encroachment; frost and medium rainfall.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Since 1980: Average: 428 mm; lowest: 150 mm; highest: 864 mm.

ELEVATION: 1390 meters above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: If the impenetrable bush that had established itself on the farm was not dealt with, the farm faced bankruptcy. At first, chemical spraying with arboricide was tried, but this had harmful effects on valuable grass and browse species and the results were unrewarding. With time, the bush-rolling technique was developed. This is an innovative way of regaining biodiversity, production and profits.

MAIN INNOVATION: Bush-rolling, to bring the bush to a high-quality, usable height; high density, selective grazing with cattle and sheep.

KEY RESULTS

• Increased animal numbers from 344 cattle and 285 sheep in 2016 to 491 cattle and 1423 sheep in 2021.

The farm is situated 23 km

west of Otjiwarongo.

- Increased stocking rate, from 33 kg/ha to 60 kg/ha (excluding game and un-weaned calves).
- Open areas and more intensive management has reduced small stock losses due to theft and predators from 18% to less than 5%.
- Very good animal fertility has been achieved: Since 2016, average calf weaning of 71%; since 2019, sheep weaning percentage of 163% (of mated ewes and cows).
- Throughout the year, animal condition remains good and at low cost.
- Very good resilience during the 2019/20 drought, where all the livestock were successfully brought through, even though bush-rolling was only practiced at scale in 2016 and the sheep only increased in 2018.
- Improved biodiversity of species (grass, herbs, shrubs and creepers).
- Reduced input costs (lick consumption has reduced since the onset of bush-rolling).
- Less labour and time required to move animals from camp to camp.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2016 INNOVATION

Description	Before innovation	After innovation (2016 – bush-rolling)
Number of camps	20	24
Number of camps per herd	4	8
Time spent in a camp	1 month (fixed rotation)	7 days during the growing season; 14 days during the non-growing
		season.
		Two selections in the non-growing season affords grazing for 7.5 months.
Time spent out of a camp	3 months (fixed rotation)	Recovery: 49 days in the growing season.
(for rest/recovery)		



Certain parts of the farm (with 87 kg/ha herbaceous material) were not treated with the roller (left). An adjacent area that was rolled three years ago produced 1000 kg/ha of herbaceous forage (right).

Forage for animals: The average amount of available grass and browse in kilograms per hectare is 824 and 364, respectively, giving a total of 1188 kg/ha of available forage to the livestock.

Tree density: The average woody tree density is 874 TE/ha. However, when using the bush-rolling approach with high density sheep, aftercare is required.

Biodiversity: The grass and bush component is made up of 19 and 13 perennial species, respectively. The Biodiversity Index of the farm is a good value (0.7), which indicates little dominance of the grasses and shrubs growing on the farm.

RESILIENCE OF THE FARM

Ecological and financial resilience was achieved during and after the 2019 drought. No destocking of the core cattle and sheep herds occurred and a 50 kg/ ha stocking rate was maintained during the drought in 2019.



MONEY-MAKING POTENTIAL OF THE FARM

An average of 71% calf weaning and 163% lamb weaning was maintained since 2018. It is planned to increase sheep numbers to 2500 and reduce cattle numbers to utilise the high-quality bush regrowth. This shows a healthy, viable business.



CHOICE OF ANIMAL/S

For the cow-calf-ox production system, only Nguni and Braunvieh bulls are used. A threebreeding rotation (crisscross) system was implemented in 2020 with Brahman, Nguni and Braunvieh bulls (three herds), with careful selection and monitoring of cow fertility. Well-adapted, bush-browsing sheep are bred on the farm.



- Instead of fighting the bush to get rid of it completely, rather bring it to a usable height through bush-rolling.
- Stock well-adapted sheep and cattle together, all year round. Engage in high density but selective grazing, which enables the livestock to utilise the high-quality regrowth to increase biodiversity and to build ecological and financial resilience.
- 3. Build in the cost of re-rolling the bush every 3-5 years, depending on the severity of regrowth.
- When bush-rolling, do not forget to maintain biodiversity in the landscape. For example, leave clusters of trees for shade (ruminating cattle) and windbreaks, and leave growth on contours to reduce runoff.
- 5. Avoid using chemicals to control bush encroachment to prevent severe biodiversity imbalances and the death of valuable browse species (*Grewia spp.* and others). Instead, use mechanical control techniques.
- The initial bush-rolling can be paid for with a charcoal production enterprise. However, remember that by doing this you remove some minerals from your land.
- Use well-adapted female breeding stock that are bred on your farm. Support them with supplements whenever necessary.
- 8. Combine sheep and cattle in herds all year round. Keep the bulls with the herd all year round.
- Keep your lambs secure for two months and assist them with a creep-feeding system to ensure they are strong upon joining the herd.



CASE STUDY SUMMARY Farm Agagia: Aerial spraying; after

Aerial spraying; aftercare; four-camp flexible approach; low stocking density



Hendrik Botha's vision in 1986 was to address bush encroachment while focusing on good rangeland and livestock management, and increasing the stocking rate to over 40 kg/ha and production per annum to 18 kg/ha. Realising this long-term vision took careful planning, diligence and ongoing hard work.

FARM FACTS

DESCRIPTION: Central Thornveld.

ENTERPRISE: Cow-calf-ox production with periodic speculation buying.

PROPERTY SIZE: 9822 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Marginally aggressive bush encroachment; medium rainfall.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average (since 1989): 320 mm; lowest (in 2019): 160 mm; highest: 734 mm.

ELEVATION: 1500 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: The farm was extremely encroached and effective control of the thick bush was a matter of survival. Doing nothing meant going out of business.

MAIN INNOVATION: Aerial spraying of arboricide in 1986; annual

chemical aftercare with moderate stocking; low density fourcamp approach; ensuring the adequate recovery of both bush and grass plants.

KEY RESULTS

- Increased sustainable stocking rate by 60% from 667 to over 1060 cattle.
- The starting stocking rate was 25 kg live weight/ha. It took six years to achieve a stocking rate of 40 kg/ha and 15 years to achieve 45 kg/ha.
- Unlike in previous droughts, the farm persisted during the 2019 drought with the entire core herd intact and stocked at 29 kg/ ha. At this time, many other farmers had to sell everything.
- The diversity of plants has increased and the animals utilise the palatable bush, forbs and legumes, which results in good animal performance and financial returns.
- The farm is a now an enjoyable, low stress operation with stable and harmonious staff relations.
- Minimal supplementation (molasses, urea and phosphate) is provided (only when needed), which saves enormously on costs.
- Annual budgets are calculated for ongoing selective bushthinning operations by hand, especially in the kalk areas.

Description	Before innovation (1977 to 1996)	After innovation (from 1996)
Number of camps	56	68
Number of camps per herd	8 camps per herd	4 camps per herd
Time spent in a camp	14 days in the growing season;	21 days in the growing season; 1 month in the non-
	1 month in the non-growing season	growing season (observation of browse plants)
Time spent out of a camp	Recovery: 89 days	Recovery: 63 days
(for rest/recovery)		

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 1996 INNOVATION



Some parts of the farm have been left un-thinned (left). The areas that have been bushthinned have a ten-fold increase in forage production and better biodiversity (right). Forage for animals: The average amount of available grass and browse in kilograms per hectare is 1350 and 217, respectively, giving a total of 1900 kg/ha of available forage to the livestock. Tree density: The average woody tree density is 1202 TE/ha.

Biodiversity: The grass and bush component is made up of 16 and 9 species, respectively. The Biodiversity Index of the farm is a high value (0.7), which indicates little dominance of the grasses and shrubs growing on the farm.

RESILIENCE OF THE FARM



Ecological and financial resilience during and after the 2019 drought. No destocking of the core cattle herd occurred and a 34 kg/ha stocking rate was maintained through the drought and recovered to 41 kg/ha in 2022.



The average calving percentage over the last 10 years has been above 90%, with a weaning percentage of 5% lower. The average live weight produced on the farm since 1990 was 16.5 kg/ha. Both of these factors indicate a healthy, viable business.

CHOICE OF ANIMAL /9



With the farm's improved resource base, stocking animals with a heavier frame is possible. Hendrik aims to wean calves that are 50% of the cows' weight. If you achieve this, you have well-adapted animals on your farm.

- 1. Should you have, or buy, a heavily bush-encroached farm, then draw up a detailed plan that includes cash flow and expenditure.
- 2. Begin with de-bushing, but also make sure that the farm is stocked to take advantage of the regrowth in the next season.
- 3. Always keep one year's worth of forage available for your core herd.
- 4. The drier your farm, the more flexibility is required. For a cow-calf system, the cows should be 80% of your herd. For a cow-ox system, the cows should be 66% of the herd.
- 5. If done correctly, speculation buying and selling is the most flexible approach.
- 6. Apply the Livestock Profitability 8-4-2-1 Approach to ensure your success.
- 7. Buy in a bull from your area that has a history of producing cows with a high milk production rate.
- 8. Be conservative with stocking. Try to stock at 50% of the estimated stocking rate based on forage availability each year. Adjust animals fast when the season demands: reduce the number of animals and keep them through the dry periods in good condition.
- 9. Make sure your animals maintain condition when they need to: plan to invest in supplements when needed. Remember, when you can see that an animal has lost condition, it has already lost 70 kg. This is expensive to regain.
- 10. If the year is not good, make the decision to destock early on.
- 11. Plan ahead and, most of all, do not panic! Have a plan and adjust it as needed. Aim for results where your income is 2.2 times as much as your expenses.
- 12. Restrict your expenses to allocate finances towards wealth-generating expenses. For example, buy a Mahindra instead of a Land Cruiser and spend the balance on generating more wealth through purchasing weaners in years of excess forage to fatten and sell.

CASE STUDY SUMMARY **Farm Venus:**

Maize; cover crop; high-density livestock production



Klaas Malan says that soil is not just dirt. Soil is home to millions of microorganisms that want to work for you - to make you a more successful farmer. But you have to stop breaking down their house (soil structure), otherwise you will face trouble as a farmer. Changing to no-till and cover cropping has great potential for reviving the land, families and communities, but the transition must be done in a carefully-planned way.

FARM FACTS

DESCRIPTION: Northern Thornveld.

ENTERPRISE: No-till maize production since 2009; cover cropping to build the soil as well as livestock production since 2019. **PROPERTY SIZE:** 1794 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Very aggressive bush growth; high-potential land; high rainfall.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: (Over the past 10 years) Average: 511 mm; lowest: 183 mm; highest: 886 mm. **ELEVATION:** 1495 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: In 2003, Klaas began farming as a hobby on 200 ha. After deciding that there must be a better way, he started no-till planting in 2009. The collapse of the construction industry, which was his main source of income, pushed him to buy more land. In 2019, Klaas planted cover crops (using 8 species including legumes, radish and millet). For the last two years, the cover crop has been Baster Babala and sorghum. During this time, Klaas saw the real potential of what can be achieved with cover cropping.

MAIN INNOVATION: No-till maize (13 years) cropping and cover cropping (4 years) for improved soil and livestock production.

KEY RESULTS

- After five years of no-till management, the structure and water holding capacity of the farm's soil improved, rendering it more drought resilient.
- After 13 years of no-till management and four years of cover cropping, the soil carbon has increased by 35%, compared with neighbouring farms under conventional management. Maize yields doubled in 2022 (poor rainfall year), compared

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE INNOVATIONS: NO-TILL CROPPING SINCE 2009; COVER CROPPING SINCE 2019

Description	Before cover cropping innovation	After cover cropping innovation	
Number of camps	6	5 camps for cows	
Number of camps per herd	1 herd for 6 camps	1 herd for 5 camps	
Growing season: The animals were rotated in the veld camps		No animals in the veld from February to	
Time spent in veld camps	from 1 November to 1 June, with 2-3 weekly	November.	
Time spent out of these camps	moves in 6 camps. On the stubble for 4 months	The animals are out of the veld camps for the	
	and then back to the veld in November.	entire growing season.	
Growing season:		5-10 days in a camp to ensure light, but high-	
Time spent in a cover crop camp		quality grazing.	
Time spent out of a cover crop	No cover crop prior to innovation.	About 30 days out of a camp before lightly	
camp		re-grazing again to keep the plants' growth	
		active.	
Non-growing season: Cattle	June/July to November	From June/July to November, the cattle are on	
on maize stubble before and		the maize stubble at higher density.	
after the innovation			



It is difficult to visually distinguish between no-till and cover cropping and conventional practices. After 13 years of no-till and four years of cover cropping, the soil carbon has increased by 35%, compared with neighbouring farms under conventional management.

- with conventional neighbouring farms. In 2020, 60 hectares of cover cropping were planted and 212 weaners with an average weight of 105 kg were purchased. The weaners spent four months on the • cover crop and 2 months on the maize stubble. By 20 July 2020, the average weight had increased to 187 kg, representing a 70% weight gain in six months.
- In dry years, the large financial losses incurred through crop failure can be
 partially offset by no-till and cover cropping with livestock. In wet years, the
 maize yields are similar to conventional neighbouring farms, but the increased livestock component results in higher
 profits.
- Although grain production has remained



more or less the same, their yields have improved during the drier years and ³. livestock numbers have tripled, which has resulted in improved profitability.

- After the first year of cover cropping, the maize fields had less diseases. As spraying for fungal or insect infestation 4. was not required, some savings on cost was achieved and the soil was spared the damaging effects of these sprays.
- Biodiversity in the fields is increasing and the whole farm is more sustainable.
- As the soil is covered for most of the year, the green growth remains in the fields for much longer.

The increased production and profitability can now afford their two sons an earning future on the farm.

800

700

600

500

400

300

200

100

In 2022, with only 800 5 180 400 mm of rainfall, 4.5 700 160 the no-till and cover Λ 600 140 cropping produced 3.5 500 120 a doubling in maize 2.5 400 100 production (3.1 tons 300 80 per ha compared 1.5 200 with 1.6 tons per ha in 60 100 40 the area). The cattle 0.5 20 numbers increased 18 from 100 LSU without 0 18 20 21 cover cropping in 2018 Maize yield tons/ha (Venus) (left axis) to 700 LSU with 155 Maize yield tons /ha (area) (left axis) Hectares planted with cover crop (left axis) ha of cover cropping - Rainfall (mm) (right axis) Cattle numbers (LSU) (right axis)

RESILIENCE AND MONEY-MAKING POTENTIAL OF THE FARM

CHOICE OF ANIMAL/S

Livestock with good genetics are used in order to realise the potential of the cover crops provided. The intention is to close the herd with 300 cows and to wean 240

in 2022



calves per year, to slaughter 120 oxen per year by selling all excess heifers as weaners, and to keep all tollies to sell as oxen (36 months old).

- The main principle of success is gaining a practical understanding of the principles and practices that are suitable to your conditions.
- To achieve this, you need to do your own research, get advice from others, and conduct small trials of new approaches to see if they work. Careful planning, financial resources and discipline are required to properly apply any approach.
- 3. It is important to work with good livestock genetics of good market value. If your sustainable stocking rate is increasing and you have good animal performance and good animal fertility, then you are in the running to increase your profit per ha over time.
- 4. You must invest where and when it is needed. For example, in fertiliser (even if you supplement with manure), and in lick for animals. If you are building the soil, you will become less dependent on these inputs. However, it is still important to do what is needed each year to keep your profits up.
- 5. First, you need to get the perennial weeds under control (decide on a thorough weedcontrol plan), then focus on bringing the soil back to a healthy state (i.e. pH, nutrient status, compaction layers), and, lastly, adopt precision farming approaches (satellite navigation).
 - nt pt te me
- 6. You need to reduce the amount of time you spend on the land with equipment and apply the following principles:
 - Move to minimum tillage/limited disturbance of the soil.
 - Integrate livestock and crop rotation with cover crops.
 - Maintain living roots in the soil for as much of the year as possible.
 - Use the least-damaging chemicals on the land.
 - Build soil carbon and healthy soils.
- 7. The principles for livestock production in the veld in the dry season include:
 - Use good genetics with a good market value.
 - Thin the most aggressive invader bush species to increase the grass, herb and forb production and biodiversity, but keep the broad-leafed palatable shrubs as they provide good-quality forage for the livestock.
 - Use high density, selective grazing methods to ensure veld improvement while achieving good animal performance and fertility.
 - Ensure adequate rest and recovery in the growing season.

CASE STUDY SUMMARY Farm Hamburg: Various me Bloubuffel

Various methods of bush control; Bloubuffel pastures; rangeland management



Peter and Sieglinde Zensi are withdrawing from active management of the farm but sees a future in good rangeland management with bush control and aftercare and planting 10% of the land to Bloubuffel (*Cenchrus sp.*) grass for

grazing and baling for drought conditions. Peter says that if you aim for nothing, you will hit it every time. In the future we will need to intensify management.

FARM FACTS

DESCRIPTION: Northern Thornveld.

ENTERPRISE: Cattle and some game.

PROPERTY SIZE: 6830 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Heavily encroached with aggressive bush; high rainfall with some frost.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 524 mm; lowest: 220 mm; highest: 1180 mm.

ELEVATION: 1520 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: Bush encroachment rendered livestock farming no longer profitable.

MAIN INNOVATION: Bush control and planned grazing.

KEY RESULTS

• Over the period of 28 years (1987-2014), the cattle production has increased by 60% (8 kg/ha to 13 kg/ha) and the stocking

rate has increased by 52% (23 kg/ha to 35 kg/ha). These results are all management, bush-thinning and rainfall related (the rainfall increased by 21% over the same period).

The farm is situated 70 km

south-west of Grootfontein.

- Fighting bush effectively remains the key priority.
- Peter has moved away from heavy cows with estimated breeding values (EBV) for high growth as they require you to stock lighter and they produce fewer calves, which results in a decrease in production per hectare. He now uses bulls that give fat, early-maturing animals.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 1987 INNOVATION

Description	Before	After
Description	innovation	innovation
Number of camps	10	17
Number of camps per herd	5	8-9
Time spent in a camp	14 days	7 days
Time spent out of a camp	56 days	54 days
(for rest/recovery)		

RESILIENCE OF THE FARM

Ecological and financial resilience from 1987 to 2014: The stocking rate increased by 52% from 23 kg/ha to 35 kg/ha.



MONEY-MAKING POTENTIAL OF THE FARM



From 1987 to 2014, animal production increased from 8 kg/ha to 13 kg/ha which indicates a healthy, viable business.



The rainfall increased by 21% over the 28-year period.



CHOICE OF ANIMAL/S

Over the 28-period, the calf weight at weaning to cow weight declined, indicating that a loss of efficiency had taken place, despite an increased production per ha. As a result of this, Peter moved away from heavy cows with EBV for high growth as they require you to stock lighter and they produce fewer calves, which results in a decrease in production per hectare. He now uses bulls that give fat, early-maturing animals.



- 1. If you do not deal with the bush effectively in these high-potential areas with good soils and high rainfall, you will go out of business.
- 2. The future lies in intensifying management, for example what is being done in the Farm Venus Case Study for high potential farms. Other farms will need active bush control, good rangeland management and 10% of the farm planted to Bloubuffel pastures.
- 3. Move away from heavy cows with 'good' genetics. Instead, use bulls that give fat, early maturing animals.
- 4. Many farmers have pushed animal density too high and have stocked too heavily. Consequently, they have gone out of business due to poor animal performance. Never compromise on animal performance.
- 5. The choice of production system is also market related. If markets remain difficult, then more farmers will move to weaner production, which involves a higher risk.
- 6. Ox production involves a lower risk. It allows for better drought planning and easier destocking by monitoring the rainfall season and the availability of grass. A cow-ox production system must be conservatively stocked.
- 7. A weaner production system is more difficult because it requires good cow management. It also involves a higher risk because it is difficult to sell off cows during a drought.
- 8. Analyse your farm's seasonal rainfall data. If the amount of rainfall by end of January is less than 50% of the average, sell now.
- 9. At current costs, you need 1000 ha on a cattle farm to meet one child's needs. This illustrates that we need to become more intensive and we need to focus on regenerative measures that complement one another. Bush will remain a problem unless it is dealt with.
- 10. Game numbers pose a real problem to management and their numbers need to be kept low.

CASE STUDY SUMMARY Farm Blystroom: Manual bi

Manual bush removal; Bloubuffel pastures



Dawie Kok. Three generations of Farm Blystroom farmers assess the effects of an unplanned fire on production. Since the 1970s, they have fought against bush encroachment. Manual debushing and planting Bloubuffel (*Cenchrus sp.*) is their main solution to the problem. Cash and cover crops are being investigated.

FARM FACTS

DESCRIPTION: Northern Thornveld.

ENTERPRISE: Cattle production on planted pastures and dunes; • sorghum and ground-bean as cover/cash crops.

PROPERTY SIZE: 5258 hectares.

FUNCTIONAL CLASSIFICATION: Very aggressive bush-thickening; Imited frost.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 450 mm.

ELEVATION: 1230 metres above sea level

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: After the Foot and Mouth outbreak in 1961, a dry year occurred. As the farm was heavily stocked and no sales were possible, it was the turning point for the grass and bush encroachment began. During the good rainfall years in the 1970s, the bush exploded and finally took over the farm. The stocking rate of the farm plummeted, causing major financial implications to the extent that something needed to be done.

MAIN INNOVATION: Mechanical clearing of fields; manual planting of Bloubuffel (*Cenchrus sp.*) pastures.

The farm is situated 75 km east of Grootfontein.

KEY RESULTS

- Having developed a very successful way of mechanically clearing fields and establishing Bloubuffel pastures, the farming family does not consider chemical treatment to be the right method.
- 1000 hectares of Bloubuffel pasture have been established.

LESSONS LEARNED

- From experience, it has been learned that bush clearing and the application of continuous grazing results in the bush returning after eight years.
- In order to overcome the struggle of keeping up with the production of Bloubuffel, a high density, fast rotation is being investigated to maintain Bloubuffel growth during the growing season.
- When the Bloubuffel pastures become weak they are replanted first with ground-nuts, and then with sorghum in the next season, which are grazed before being replanted with Bloubuffel once again.
- Our stocking rates and densities have been too low and our recovery periods too long in order to stimulate the Bloubuffel effectively, keeping them in a productive and high-quality state of growth.
- Farms with similar rainfall in South Africa aim to produce 200 kg/ ha on Bloubuffel pastures that were established 15 years ago. With 1000 ha of Bloubuffel already established on Farm Blystroom, the potential is immense, even if a quarter of this can be reached.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 1993 INNOVATION

Description	Before innovation	After innovation
Number of camps	9	60 camps with veld and Bloubuffel
Number of camps per herd	1 camp per herd	10 herds of cattle – 6 camps per herd
Time spent in a camp	All year round	Medium density: 100 cows spend 5-8 days in a camp.
		Note: Currently, too few livestock at too low a density with long
		recovery periods does not optimise production.
		Every year, when the Bloubuffel quality deteriorates, the livestock is
		moved to the veld.
Time spent out of a camp	None	Graze Bloubuffel once per season; the veld has a full season to recover
(for rest/recovery)		every year.



A thick, aggressively bush-encroached area (left). A cleared, de-stumped and highly productive Bloubuffel-planted area (right).

RESILIENCE AND MONEY-MAKING POTENTIAL OF THE FARM

Low density grazing allows for too much selection and over-resting of the Bloubuffel, which results in tall, stalky plants with only small amounts of good quality forage at their tips. Low density grazing also encourages other grass species of poorer quality to establish. The Bloubuffel-planted pastures would benefit from a high density, fast-moving rotation system to maintain their growth, to stimulate the liquidcarbon pathway, and to provide good animal performance and high production per hectare. This would encourage the Bloubuffel tufts to become larger and to creep along the ground to establish new plants. This approach would enable the planted Bloubuffel pastures to last longer before requiring additional intervention.

The resilience and income generating potential of these fields can be improved by applying high density, fast-moving selective grazing to stimulate the plants.



CHOICE OF ANIMAL/S



Braunvieh and Nguni crosses in a field first planted with Bloubuffel in 2005-6, which now requires replanting.

- For aggressive bush-thickening in areas with good soils and good rainfall, it makes sense to intensify your practices, using the most cost-effective ways to get rid of the bush.
- 2. Bloubuffel pastures are productive. However, you must make sure that you have enough animals for their grazing to stimulate the Bloubuffel effectively, keeping them in a productive and highquality state of growth.

CASE STUDY SUMMARY Farm Pommernhagen:

High-density grazing with cattle and sheep (no bush control)

In 2012, Thorsten and Ursula Lüsse adapted their grazing approach to achieve rangeland improvement and increased animal performance. In 1972, when the family first arrived on

the farm, there was only one perennial grass tuft. Now, the veld is dominated by perennial grasses and the Swarthaak trees are dying off naturally.

FARM FACTS

DESCRIPTION: Central Sandveld/Kalk.

ENTERPRISE: Adapted cattle and sheep with limited game.

PROPERTY SIZE: 5031 ha.

FUNCTIONAL CLASSIFICATION OF AREA: Frost controls bush; non-aggressive bush thickening; no bush control needed.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 250 mm; lowest: 36 mm, highest: 750 mm.

ELEVATION: 1350 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: When the family first settled on the farm in 1972, they believed that if they managed the farm correctly, the perennial grasses would return.



The farm is situated 40 km south of Nina and 180 km south-east of Windhoek.

MAIN INNOVATION: High density selective grazing, fast rotation with well-adapted sheep and cattle, and a sustained focus on achieving good animal performance.

KEY RESULTS

- Average of 87% cattle calving and 100% lamb weaning throughout the ten-year period.
- Sustainable stocking rate improved from 20 kg/ha to 30 kg/ha.
- Throughout the ten-year period, the kilograms live weight produced per hectare was 11 kg/ha.
- Considerable reduction of input costs.
- Core herds of cattle and sheep were brought successfully through the 2019/20 drought.
- Achievement of financial resilience due to drought resilience and good performance and fertility of the animals.
- Reduced predator-related losses of sheep and calves due to a regularly patrolled electrified perimeter fence.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2012 INNOVATION

Description	Before 2012 innovation	After 2012 innovation
Number of camps	20	56
Number of camps per herd	1 herd per camp	About 10 camps per herd with 4 herds in the growing season (cattle and sheep herds combined). 10 herds in the non-growing season (cattle and sheep herds separated).
Time spent in a camp	Continuous	7 days in the green season (weaker camps hold a lower number of animals).
Time spent out of a camp (for rest/recovery)	None	Growing season: Variable (depending on growth rates), with 5 weeks the shortest and 11 weeks the longest recovery. Non-growing season: 2 weeks in a camp with 2 selections of cattle and sheep.

Before, the farm was dominated by annual grasses. After 10 years of applying high density selective grazing, the veld is now dominated by perennial grasses.

Forage for animals: The average amount of available grass and browse in kilograms per hectare is 692 and 269, respectively, giving a total of 962 kg/ha of available forage to the livestock.

Tree density: The average woody tree density is 604 TE/ha.

Biodiversity: The grass and bush component is made up of 7 and 4 perennial species, respectively. The Biodiversity Index of the farm is a medium value (0.5), which indicates that some species are starting to dominate the grasses and shrubs growing on the farm.

After

RESILIENCE OF THE FARM

Ecological and financial resilience during and after the 2019 drought. No destocking of the core cattle and sheep herds occurred and a 30 kg/ha stocking rate was maintained.



MONEY-MAKING POTENTIAL OF THE FARM

Before

An average of 87% cattle calving and 100% lamb weaning was maintained throughout the ten-year period. The live weight produced on the farm during the ten-year period was 11 kg/ha. Both of these factors indicate a healthy, viable business. Note the drop in kg/ ha production the year after the 2013 and 2019 droughts.

140% 16 14 120% 12 100% 10 80% 60% 40% 20% 0% 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 Percentage lambs weaned (left axis) % Cow pregnancy (left axis) Production (kg/ha) (right axis)

CHOICE OF ANIMAL/S



Well adapted, low input and early-maturing animals: Dorper/Damara sheep crossbred with Meatmasters (which have three breeding seasons) and Bonsmara cattle. Rams and bulls with guality genetics have been introduced to the herds.

- 1. A regenerative grazing approach stimulates favourable plant growth, increases animal performance and numbers, and builds resilience to drought.
- 2. Keep the number of herds as small as possible. This has a hugely positive impact on veld recovery time, and the management of fewer herds is easier.
- 3. Situate water troughs in the middle of the camps, not in the corners. This eliminates typically overgrazed water points.
- 4. Predator problems with small stock: Build an effective boundary fence; focus on controlling the predators inside. This saves time and effort.
- 5. Use mobile electric fencing instead of permanent fencing to save costs.
- 6. Decide on well-adapted breeds for your area; use a three-month breeding season; select for fertility; close the herds when you have the right number of animals and calving into good conditions. Two breeding seasons split risks (i.e. market prices).
- 7. Establish daily, weekly and monthly farming activity routines; stick to them.
- 8. Plan for drought: regenerative grazing approach; appropriate animals for the area: and do not stock farm to maximum - always try to have grazing available.
- 9. Assess grazing and act fast: sell if shortages are detected; if in excess, buy animals in August/September. Depending on prices, calculate to buy cows with calves/pregnant cows/weaners. Decide when to market and sell at this time.

CASE STUDY SUMMARY

Farm Hessen:

Split Ranch Approach: use one half of the farm this year, the other half next year



Richard Kamukuenjandje's mantra is 'be hard on facts but soft on people'. Farming is a family venture. By farming, you are managing a living system, so in order to succeed, you must be adaptive and learn what to do and when.

FARM FACTS

DESCRIPTION: Central Sandveld/Kalk.

ENTERPRISE: Adapted cattle, sheep and goats.

PROPERTY SIZE: 1400 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Non-aggressive bushthickening (no bush control required); severe frost at times.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 240 mm; lowest: 60 mm; highest: 900 mm.

ELEVATION: 1380 meters above sea level.

OWNED OR RENTED: Ministry of Agriculture, Water and Land Reform: Resettlement; part-time management with three labourers and a family manager.

MOTIVATION FOR CHANGE AND APPROACH: This approach is ideal for a part-time farmer as it has low infrastructure and maintenance costs. It also grows a lot of forage for the livestock and gives good animal performance. Being a part-time farmer, I needed an

approach that would be simple to oversee and manage remotely. **MAIN INNOVATION:** Split Ranch Management Approach since 2011.

The farm is situated

60 km south

of Gobabis.

KEY RESULTS

- The Split Ranch Management Approach is simple, practical and effective for part-time farmers.
- The chequerboard grazing approach improves fire management.
- A ten-year average cattle calving percentage of 66%.
- The resource base has improved, where perennial Finger grass is returning to many camps.
- Before the drought in 2019, the farm was stocked at 1 livestock unit (LSU) on 6 ha.
- The extended five-year drought period from 2013 to 2019 resulted in early destocking of a 100 animals in May 2016. The ongoing drought resulted in more animals having to be moved to another farm during 2019 and 2020.
- The rangeland has recovered since 2019.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2011 INNOVATION

Description	Before innovation	After innovation
Number of camps	6	6 (3 camps used this year and the other 3 camps used the following year)
Number of camps	2 herds; 4	3 camps per herd, following the Split Ranch Approach. The small stock follows another rotation
per herd	camps per	at the discretion of the herder, who pursues opportunistic approaches (areas with less predators
	herd	and thieves, areas with good browsing potential and areas which sprout earlier).
Time spent in a	1 week to	Half of the farm is rested every year. The half on which the animals are present is managed
camp	14 days	as follows: All the animals use 3 camps from August this year (or when the veld is sufficiently
	(depending	green). From September they stay in a camp for 2 to 3 months until it rains, and then they move
	on size of	monthly. In May every year, the animal numbers are adjusted. In the non-growing season, the
	camp)	animals spend 1 month in each camp. There must be cover and forage left by August.
Time spent out of	Resting	Growing season: 3 months until the rain comes and then they move every month, giving 2
a camp (for rest/	period of	months' recovery. The other three camps have a full growing season of rest.
recovery)	60 days in	Non-growing season: 1 month in a camp and then moved. The other three camps are not
	the rainfall	grazed at all.
	season	The animals are moved to the previous year's rested three camps in September, when they are
		green enough.



2010 (left) and 2021 (right) at the same site on the farm, showing impressive increases in production and soil cover.

KEY TIPS FOR GROUP FARMERS

- 1. Trust the approach, collect data, observe the veld, and take decisions early on.
- 2. Keep your focus on the key aspects of the farm.
- If you have to, move your animals out early during a drought. Do not worry about what others think of your approach – if it works, do what is best for you.
- Keep transparent records of the other owners' livestock; keep them informed of progress and any concerns or matters that need attention.
- 5. Have a day-to-day manager in place.
- 6. Have a clear, inclusive decision-making process in place that involves all livestock owners.
- 7. Do not glorify a grazing approach; it is a tool to achieve your objectives. If you need to destock, do it early.



Forage for animals: After 11 years of applying the Split Ranch Approach, the average amount of available grass and browse in kilograms per hectare is 675 and 311, respectively, giving a total of 986 kg/ha of available forage to the livestock.

Tree density: The average woody density is 628 TE/ha.

Biodiversity: The grass and bush component is made up of 11 and 6 species, respectively. The Biodiversity Index of the farm is a medium value (0.5), which indicates that a few species are starting to dominate the grass and shrubs on the farm.

CHOICE OF ANIMAL/S



Richard has tried many breeds and is now looking for animals that are early maturing and of a smaller frame size, and that have greater drought tolerance. He is moving towards Nguni-Boraan mixes with Brahman and aims to have 70% African genetics and 30% Indian breed (Brahman) genetics.



CASE STUDY SUMMARY

Farm Molly:

Split Ranch Approach: use one half of the farm this year, the other half next year



Mario and Karin Metzger have operated a successful cattle farm under the Split Ranch Management Approach for the past 11 years.

FARM FACTS

DESCRIPTION: Eastern Sandveld.

ENTERPRISE: Cattle production with some game.

PROPERTY SIZE: 9764 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Moderately aggressive bush-thickening; sandy soils; heavy frost.

AVERAGE ANNUAL RAINFALL/ VARIABILITY: (Over the past 55 years) Average: 365 mm; lowest: 147 mm; highest: 850 mm.

ELEVATION: 1200 metres above sea level.

OWNED and OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: When the Metzgers took over the farm in 1995, they operated with small stock at the homestead and cattle in larger camps. However, over time they observed that the animal numbers were decreasing and grass production reducing each year. Something needed to be done or they would go out of business.

MAIN INNOVATION: Split Ranch Management Approach.

KEY RESULTS

• The Split Ranch Approach provides a sound framework. By sticking to the rules and broad principles, it is easy to manage and stress-free.

The farm is situated 100 km east of Gobabis.

- No losses to predators due to a constant human presence and movement throughout the livestock-occupied camps on a daily basis, calves being handled early on to transfer the smell of humans, and donkeys accompanying the cows during the calving period.
- The production per hectare was maintained between 7.5-8.3 kg/ ha from 2011 to 2022, using no urea and a bush-promoting lick.
- Achieved a fertility rate of 78% over the twelve-year period with limited provision of lick. No urea is provided with the lick.
- During the drought in 2019, 40% of the herd needed to be destocked, which is recovering well after the drought.
- The resource base is improving with the return of perennials, and resilience has increased.
- Limited losses to poisonous plants and minimal tick control is required because of long rest periods.
- No major infrastructure costs are required and other costs remain the same. Some saving is possible due to lower lick and tick-control costs.

Description	Before innovation	After innovation (Split Ranch Management Approach)
Number of camps	25	25 (no infrastructure changes required).
Number of camps	4 camps per herd	4 camps per herd in total. Most herds have 2 camps per herd for the year
per herd		they are in use.
Time spent in a	1 week to 14 days in a camp	Half of the farm is rested. For the half on which the animals are present, they
camp	(depending on camp size).	are rotated from September until May between the 2-4 camps with a resting
		period of between 30-45 days (depending on the camps' sizes).
		From June until August, the animals graze permanently in the camps in use
		this year. The gates are open and they decide for themselves where to graze.
Time spent out of	Resting period of 60 days in the	In the next year, all the camps grazed in the previous year are rested for the
a camp (for rest/	rainfall season and 45 days in	entire growing season.
recovery)	the dry season.	

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2011 INNOVATION



A camp on Farm Molly in 1964 showing open grassland (left). The entire farm has changed dramatically since 1964 and is now considered encroached (right).

Forage for animals: The average amount of available grass and browse in kilograms per hectare is 805 and 446, respectively, giving a total of 1251 kg/ha of available forage to the livestock. **Tree density:** The average woody tree density is 2234 TE/ha. **Biodiversity:** The grass and bush component is made up of 15 and 11 perennial species, respectively. The Biodiversity Index of the farm is a medium value (0.5), which indicates that a few species are starting to dominate the grass and shrubs component growing on the farm.

RESILIENCE OF THE FARM

Ecological and financial resilience during and after the 2019 drought. 40% destocking occurred and a 10 LSU/ ha was maintained throughout the drought.

MONEY-MAKING POTENTIAL OF THE FARM

An average of 78% cattle calving was maintained throughout the twelveyear period. The live weight produced on the farm during the twelve-year period was 7 kg/ha. Both of these factors indicate a business affected by the drought but recovering.

CHOICE OF ANIMAL/S

Calves in 2021 and weaners in March 2022. The animals have learned to browse bush, on which they perform well. Although the water is of poor quality, the animals manage well on it. The mother stock handles predators well. Selection is very strict and based on fertility; if a cow loses a calf then the cow is sold.







- The Split Ranch Management Approach is a good approach. It allows for the simplification of management. Although it is also suitable for part-time farmers, we believe that the approach requires you to be present.
- 2. Get expert advice when you start. This is expensive but worthwhile.
- 3. Start off as a weekend farmer with a supplementary source of income until you have built your herd and established the farm, then move into full-time management. Alternatively, you could rent a farm to build up stock, and then buy a farm.
- 4. Employ good, reliable staff and support them well. The cattle men need to be experienced and dedicated; however, you also need to motivate, supervise and support them. There needs to be precise and firm routines that everybody sticks to, on a daily, weekly and monthly basis.
- The Split Ranch Approach is easy but this does not mean that you can sit at home
 – you still need to know and control what is happening on the farm.
- 6. It is very important to move among your cattle, to have a presence in the camps, to drive the boundaries to check fences and movement, to count the cattle at least once a month, and to find those who are missing. Presence deters predators!
- The Split Ranch Approach provides a sound framework, but you need to stick to the rules and broad principles. If you make amendments, these must be done in a well-considered, structured way and not out of panic.
- 8. Game numbers must be kept low to enable recovery.
- When you start, do not make your selection criteria too strict. Keep cows to build numbers faster and to have better cash flow and only then select more rigorously at a later stage.

CASE STUDY SUMMARY

Farm Donkerbos: Mara Approach: rest two-thirds of the farm every year during the main rainy season (February to April) with maximum root growth during early winter (May to June)



Roelie Venter applies the Mara Grazing Approach, which is being demonstrated during an information day on his farm.

FARM FACTS

DESCRIPTION: Eastern Sandveld.

ENTERPRISE: Weaner production.

PROPERTY SIZE: 4190 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Deep sandy Camelthorn savannah with palatable bush; heavy frost.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 380 mm; lowest: 206 mm; highest: 673 mm.

ELEVATION: 1280 metres above sea level.

OWNED OR RENTED: Owned; part-time management (full-time job in Windhoek; separate farm enterprise on rented farmland in the Rehoboth area to fatten weaners).

MOTIVATION FOR CHANGE AND APPROACH: After buying the farm in October 2013, a practical, productive and profitable rangeland management approach that can be managed while engaged in full-time employment in Windhoek needed to be implemented. In order to repay loans and to survive, the stocking rate needed to be sustainably increased.

MAIN INNOVATION: The Mara Grazing Approach.

34

KEY RESULTS

• No additional infrastructure required to apply the Mara grazing approach.

The farm is situated

110 km east of

Gobabis and 45 km

south of Buitepos.

- Easy and effective part-time management with good staff and very good results.
- Good fodder-flow management, with early warning if stocking is not correct.
- Good animal performance (80% cow calving) and good animal production (12.4 kg/ha) since 2019.
- Selection for fertility resulted in a reduction in mature cow weight over the first few years and markedly better condition, especially the new breeding heifers that were put to the bull.
- Beneficial improvement of the resource base over a short period of time, showing the return of Brachiaria and perennial Finger grasses.
- The area that was selectively bush-thinned (treat one problem species and leave the next one) with arboricide during 2019 currently has four times more biomass than the average of all other investigated sites. The total cost (the chemical and labour) was less than N\$300/ha during 2019-2021.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2013 INNOVATION

Description	Before innovation	After innovation (farm is divided into thirds: early and main rainfall periods and non-growing period)
Number of camps	24 (when the farm was bought in 2013)	24 camps of which a group of only 8 camps are used by the 4 herds at any one time. The remaining 16 camps are being rested.
Number of camps per herd	Unknown	The priority herds always get the best of the 8 camps being used.
Time spent in a camp	Unknown	The herds stay for 3, 4 or 5 months in the group of 8 camps, depending on the time of year (see Table 3).
Time spent out of a camp (for rest/recovery)	Unknown	The group of 8 camps (green in Table 3) that are grazed by the 4 herds from February to June are all rested for 16 months and re-grazed from November to January. These 8 camps are then grazed again from July to October after they have rested from February to June (5 months).

	Oct to Jan (4 months) (Variable rain)	Feb to June (5 months) (Main rainfall season)	July to Sept (3 months) (No rain)
	EARLY GROWING SEASON	LATE GROWING SEASON	NON-GROWING SEASON
2019/2020	Rested – some stimulation of liquid- carbon pathway (LCP) through growth.	Grazed – stimulation of LCP and soil building. Poor rains: move early.	No animal impact following grazing – possibly good for sandy soils?
2020/2021	Rested whole season – some stimulation of LCP through growth.	Rested whole season – promotes root growth and seed production.	No animal impact following full rested season – possibly good for sandy soils?
2021/2022	Grazed early – limited stimulation of LCP unless good early rains. Poor early rains: move earlier.	Rested after early season grazing – promotes root growth and seed production.	Animal impact after late season rest; soils prepared for next rains.

Table 3: Summary of the grazing plan showing grazing frequency over three years (green boxes).



Forage for animals: The average amount of available grass and browse in kilograms per hectare is 849 and 351, respectively, giving a total of 1200 kg/ha of available forage to the livestock. **Tree density:** The average woody tree density is 1268 TE/ha.

Biodiversity: The grass and bush component is made up of 14 and 9 species, respectively.

The Biodiversity Index of the farm is a medium value (0.5), which indicates that some species are starting to dominate the grasses and shrubs growing on the farm.

RESILIENCE OF THE FARM 800 40 700 35 600 30 500 25 400 20 15 200 10 0 2013/14 2014/15 2015/16 2016/17 2017/18 2018/19 2019/20 2020/21 2021/22 Average stocking rate (kg live weight/ha) (left axis) Annual rainfall (mm) (right axis)

Ecological and financial resilience during and after the 2019 drought. The stocking rate was maintained at 36 kg/ha throughout the drought in 2019.

CHOICE OF ANIMAL/S

Selection is for earlymaturing animals with high fertility rates that are suitable for the farm's conditions. All selected breeding bulls must be mediumframed, early-maturing animals that gain weight fast and maintain condition during the tough winters. Mating season has been adapted to the best available forage and is from March to May and October to December. This gives two calving seasons from December to February and July to September.



MONEY-MAKING

nual rainfall (mm)

Average stocking rate (kg live weight/ha)

logram live weight

Pregnancy rate (cows in

lactation and

nancy rate (heifers)

viable business.

oduced/ba

older)

POTENTIAL OF THE FARM

2019/20

340

36

12

An average of 80% calving for cows

from 2020 to date. The average live

weight produced on the farm since

2019 was 12.4 kg/ha per year. Both

of these factors indicate a healthy,

2020/21

673

38

13.5

77%

89%

2021/22

364

32

11.8

82%

72%

A well-adapted, medium-framed cow in good condition with a healthy calf.



Cattle utilising browse after the first frost.

- 1. The cattle herd must adapt to the rangeland management system and potential of the farm not the other way around.
- 2. Rest can only take place in the rainfall season. Root development is negatively correlated with vegetative plant growth. Maximum root growth occurs during early winter.
- 3. If you are engaged in full-time employment elsewhere, sufficient management time on the farm is the biggest limiting factor. Therefore, employee management, motivation and sufficient control measures are critical, and good relations with your neighbours is paramount.
- 4. Change in rangeland condition takes time as does selecting for a more adapted herd.
- 5. A mind shift is needed to stay focused on applying the key principles of rangeland management to improve the rangeland and to make the cow herd more profitable.
- Select for medium-framed, early-maturing animals with high fertility rates that gain weight fast and maintain condition in tough winters.
- 7. Only give non-pregnant first-calving cows a second chance; all other non-pregnant animals will be moved to rented land for fattening and slaughtering.
- 8. Cow condition at calving is an important factor as it determines re-conception three months later. Pregnant cows must be provided with enough time to recoup their condition after weaning the previous calf.
- 9. Focus on animal performance and support the animals with supplementation when needed.
- 10. Less camps available for every herd puts more grazing pressure on the cow herd. Expect cow condition to deteriorate initially and conception figures to worsen initially. Bigger-framed cows are often the first to fall out of the system.
- 11. Stick to the set grazing plan, count animals every two weeks when you are on the farm and then decide if you need to re-allocate priority herds to better camps. This simple plan means that no animals change camps when you are not there.
- 12. In the Mara Grazing Approach, the group of camps that are utilised from July-September in this year will be utilised again in next year from February-June. These camps need to recover fully by the end of January next year after being grazed until September. Therefore, care should be taken to avoid over-utilisation of the group of camps from July-September for the respective year and adjustments must be made if needed.

CASE STUDY SUMMARY

Farm Tokat:

Ultra-high density grazing; veld in non-growing season; *Cenchrus* pastures in growing season



Detlev and Stephanie Rösemann's motto is to: Plan and then start. Do not hesitate too long. Know where you want to go, start with what you have, do what you can, and improve as you go along.

FARM FACTS

DESCRIPTION: Eastern Sandveld.

ENTERPRISE: Ultra-high density grazing (UHDG) cattle farming with planted pastures as well as veld; cow/calf, weaner and oxen production system.

PROPERTY SIZE: 7400 hectares (including 690 ha of Bloubuffel and mixed grass pastures).

FUNCTIONAL CLASSIFICATION OF AREA: Sandy area with moderately aggressive bush thickening and frost.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 483 mm; lowest: 250 mm; highest: 900 mm (2000-2022).

ELEVATION: 1580 metres above sea level.

OWNED OR RENTED: Owned (Kühl/Rösemann family); full-time management.

The farm is situated 85 km

MOTIVATION FOR CHANGE AND APPROACH: After taking over the farm in 2018, the Rösemanns decided to sell cattle in order to adjust the stocking rates to sustainable limits, and to opt for the ultra-high density grazing (UHDG) approach.

MAIN INNOVATION: Ultra-high density grazing on planted Bloubuffel pastures in the growing season and on veld in the nongrowing season, while building a herd of well-adapted animals that graze non-selectively.

KEY RESULTS (since 2018)

- Building a well-adapted herd through the 2019 drought.
- Improved cattle performance.
- Improved ground cover and grass production.
- Increase in profitability.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2018 INNOVATION

Description	Before innovation	After innovation	
Number of camps	36 (excluding the	On veld: approximately 10-15 electric fence moves per day per herd	
	agricultural camps)	from May to October per herd (1800 x 5 herds = 9 000 moves on	
		veld). On <i>Cenchrus</i> pastures: similar number of electric fence moves	
		from November to April.	
Number of camps per herd	4-6	Approximately 9 000 moves in the veld per annum	
Time spent in a camp	2 weeks to 1 month	15 minutes to 1 hour during the day (each interval: 0.15-0.3 ha);	
		1-2 hours lunch interval (0.6-1 ha); 14 hours at night (1.5-3 ha) – all	
		depending on the large stock unit (LSU), size of the herd and food	
		availability.	
Time spent out of a camp (for rest/	Approximately 10	At least 14 months. During every growing season veld rests while	
recovery)	weeks	Cenchrus is grazed.	
Herd constellation	Several	Only 5 herds: Heifers (including yearling oxen); first-calf-cows; bulls	
		(strip grazing); milking cows (strip grazing).	
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Forage for animals: The average amount of available grass and browse in kilograms per hectare is 1391 and 454, respectively, giving a total of 1845 kg/ha of available forage to the livestock.

Tree density: The average woody tree density is 1111 TE/ha.

Biodiversity: The grass and bush component is made up of 12 and 9 species, respectively. The



Biodiversity Index of the farm is a medium value (0.6), which indicates that a few species are starting to dominate the grasses and shrubs growing on the farm.

RESILIENCE OF THE FARM

Ecological and financial resilience was achieved during and after the 2019 drought. Stocking rate increased from 25 kg/ha to 41 kg/ha since 2018.



MONEY-MAKING POTENTIAL OF THE FARM

An average of 62% calving was achieved from 2019. The live weight produced on the farm increased from 6 kg/ ha to 15 kg/ha since 2018. The Rösemanns believe that potential exists to increase the calving percentage and that lower calving percentage is offset by the increased stocking rate.



CHOICE OF ANIMAL/S



The fundamental principle applied during cattle selection is to retain the individuals that are reproducing, regardless of their breed and/or their appearance. Most of the time these 'reproducing' individuals are those with the 'fullest package' and the best body condition that stem from non-selective grazing.

KEY TIPS FROM THE FARMER

- 1. If you practice Ultra-high Density Grazing, daily visits to the livestock herds are required to ensure that the cattle are full (well fed) and receiving the appropriate husbandry, which leads to proper body condition, good health and shiny coats.
- 2. UHDG is not a quick fix; however, a focused mindset and the necessary patience will bring about rewarding results.
- 3. Plan ahead to cater for what is needed with regards to animals and infrastructure (or the replacement thereof). Do the financial plan-ning to deal with these expenses in advance.
- 4. Invest early on in wealth-generating expenses: genetics (good cattle stock), handling infrastructure, watering systems, and suchlike.
- 5. Any grazing management system needs to work in harmony with the type of cattle being used; therefore, choosing the appropriate genetics must be a priority right from the start.
- 6. Make sure you have early-maturing, welladapted livestock - they are the key to your success. Adapted cattle do eat bush and perform very well on it. As much as possible, try to purchase adapted bulls from the immediate vicinity of your farm.
- 7. Due to selection pressure, a lower pregnancy rate is almost certain, compared with conventional farming practices. This lower pregnancy rate is, however, offset by higher stocking rates.
- 8. To run a sustainable cattle operation, focus on the combination of factors that create a 'product' that generates profits (N\$/ha). Do not focus on trying to achieve the best individual weight or price per animal.

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EASE STUDY SUMMARY Farm Dabis (East): Aeria low st

Aerial spray; aftercare with fire; flexible four-camp approach; low stocking density



Chris Coetzee says that the cost of a bakkie bought in 1970 is the same for a number of weaners today (R2200). Cars are not more expensive; rather, farm productivity has drastically declined, and this we need to intensively interrogate as a business, as a science, and as an art.

FARM FACTS

DESCRIPTION: Eastern Sandveld.

ENTERPRISE: Speculation: Buying in cattle with high weight gain potential, fattening and selling.

PROPERTY SIZE: 6700 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Non-aggressive bush-thickening; severe frost.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: (For the past 66 years): Average: 433 mm; lowest: 164 mm; highest: 832 mm.

ELEVATION: 1286 meters above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: Chris wants to develop the farm to its optimum income generating potential, starting with the grasses, and then all the other possibilities, such as dryland maize production and vegetable production.

MAIN INNOVATION: Aerial bush-thinning and rangeland management at low density with long recovery periods and burning as an effective aftercare method. Farm Dabis is situated 90 km east of Gobabis and 35 km west of Buitepos.

KEY RESULTS

- Before Chris ran a cow-calf herd, he has never had to sell or move livestock because of drought.
- Aerial spraying of arboricide has left a good balance of trees, palatable shrubs, forbs and grasses.
- Instead of using arboricide for aftercare six years after the aerial spraying, fire is used. The camps are rested for one year to build up fuel, and then burned. Burning is cheaper and more effective than arboricide.
- Low input costs after aerial spraying.
- Several perennial grasses have returned under various conditions. Regeneration is clearly under way.
- Finger grass (*Digitaria*) and *Brachiaria* are returning in areas where big trees have died after the aerial spraying. As no charcoaling took place, the grasses are establishing under these dead trees.
- *Panicum* is taking over from the suurgras (*Schmidtia*) in the riverine areas and is now starting to move into the open. As frost kills the Sekelbos (*Dichrostachys*) in the area, it remains at a usable height.
- Kweekgras (*Cynodon*) has steadily colonised the gully walls, which are now sloping instead of steep. This indicates that the water is staying on the land and not flowing fast and angrily, causing damage along the way.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2016 INNOVATION

Description	Before innovation	After innovation
Number of camps	18	38
Number of camps per herd	4	9
Time spent in a camp	1 month	14 days
Time spent out of a camp (for rest/recovery)	90 days	112 days

Before the aerial spraying in 2016, the bush was thick with virtually no production.

After the aerial spraving in 2016 and the introduction of low density cattle management with long recovery periods, a dense perennial grass pasture with palatable bush and trees has developed.







The visible expansion of Finger grass tufts that have established themselves as runners in a straight line (left). Finger grass growing from within an old Stipagrostis tuft. Chris believes that the application of cattle at low densities over-rests the Stipagrostis, which turns them into ideal locations for other broadleafed grasses to establish (right).

INSPIRING PROPOSAL FROM THE FARMER

The days of the small farmer are over. Farmers now need to think bigger, work together, and share resources. An idea for the future would be to assess the potential of a collection of owned farms in the same area based on rainfall, ground water, frost and arable land. As such, a land potential plan could be developed, which would include the formation of a company under which all of these farms would be managed. The company would include a director to manage the farms as a company and skilled technical people to realise the enterprise's potential. The farm owners would not be involved in the day-to-day decision making but would receive dividends depending on their contribution to the enterprise.

- 1. To be a good farmer you must get to know your farm (i.e. the layers of soil and how they function, regrowth rates on different soils, arable soils, best-potential areas, and suchlike).
- 2. Every plant (grasses, forbs, shrubs and trees) has a function as well as a reason for being where it is. Get to know the plants on your farm, and how to manage them.
- 3. Waterpoints are good stocking indicators. If the waterpoint is dominated by annuals, you are overstocked; if dominated by good perennials, you are moving in the right direction.
- 4. After each management action, walk through the camps from time to time and observe what has happened. What has changed or not changed?
- 5. When controlling bush, regardless of which method you use, make sure that you leave enough big trees to provide shade and 😿 shelter and enough palatable bush. This \square is vital for animal performance as well as maintaining a healthy biodiversity balance of trees, shrubs, forbs and grasses.

- 6. When to move to the next camp:
 - Know what to expect from each camp (i.e. what is there, quality and quantity with regards to time spent in the camp, animal performance and stimulation of favourable plants).
 - When lick consumption increases and/ or animals spend more time at the water, move to the next camp.
 - Observe what is being eaten. Move the animals before the preferred plants are re-eaten.
- 7. You need to plan what to do when and where, and you need to decide which approach gives you the greatest marginal outcome (i.e. the best return for the money spent).
- 8. Do not use arboricide in rivers or areas that have a shallow (2 metres) sand layer with a clay layer below. The arboricide penetrates the sand layer but travels downslope above the clay layer and kills trees far from where the chemical was applied.

CASE STUDY SUMMARY Farm Krumhuk: Planned gra

Planned grazing and combined herding; high predator compatibility

Clemens and Ulf-Dieter Voigts say that it is important to caringly observe nature as well as the people around you to find answers for your management questions. This is as important as all the charts, measurements and records needed to measure your success.

FARM FACTS

DESCRIPTION: Central Highland Thornveld.

ENTERPRISE: Diversified organic and biodynamic farm; main extensive land-based activities are cattle using the planned grazing and combined herding (PGCH) approach with game.

PROPERTY SIZE: 8500 hectares (of which only 4000-6000 ha are used by cattle due to steep mountainous landscapes).

FUNCTIONAL CLASSIFICATION OF AREA: Escarpment with plains and hills; frost conditions.

AVERAGE ANNUAL RAINFALL AND VARIABILITY:

Average: 427 mm; lowest: 172 mm; highest: 1015 mm.

ELEVATION: 1850 metres above sea level.

OWNED/RENTED: Section 21 Company – Not for gain; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: The severe impact that the 1980s drought conditions had on the farm (as well as nationally) stimulated the farmers to look at new ways of increasing their farming resilience and of building a community of practice.

MAIN INNOVATION: Planned grazing and combined herding with livestock guarding dogs; mobile overnight kraals to enable safety; using regenerative, organic and biodynamic principles.

KEY RESULTS

- Predator losses have decreased from 40 calves to 1-2 calves per year as a result of using planned grazing and combined herding, Anatolian dogs, and mobile overnight kraals.
- Calving percentage is an average of 72% since the onset of planned grazing and combined herding and bulls remaining with the herd all year round.
- Reduced input costs by only providing block salt to the animals due to low phosphate needs on this farm.
- Noticeably improved resource base, with improved ground cover and a reduced flow into gullies and dams.
- Direct market to the public and to organic market outlets in Windhoek enables good prices.
- Human-livestock interactions are calm and stress free.
- The building of a community of knowledge and practice.

Forage for animals: The average amount of available grass and browse in kilograms per hectare is 651 and 256, respectively, giving

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2014 INNOVATION

Description	Before innovation	After innovation	
Number of camps	31	12 fenced camps. Herding has allowed some internal fences to be taken down.	
Number of camps per	24	All cattle are kept in one herd and herded to a new unfenced 'camp' each day and	
herd		allowed to graze selectively (an estimated 180-360 camps per herd). Every day,	
		80x80-metre electric-fenced mobile overnight camps are erected, allowing for	
		360 overnight camps (animal impacted areas) per year (230 ha per year).	
Time spent in a camp	2 weeks	1 day in growing season; 1 day in non-growing season (herders move livestock to	
		a new grazing 'camp' daily).	
		Note: Some areas along routes (e.g. to water) are grazed more often, where	
		higher animal impact occurs.	
Time spent out of a	3 months in	The aim is to graze once per growing season and once in the non-growing	
camp (for rest/recovery)	growing season	season. The herd size determines whether the whole farm can be grazed in the	
		growing and non-growing seasons.	



south of Windhoek.

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Above: Illustrates the effect of collected bush being used to slow and redirect the flow of water.

Right: The distinctive green area signifies a trial electric-fenced overnight kraal erected in June 2018, where 500 head of cattle were kept overnight for seven days (still visible today in 2022). The herd provided a high dung and urine impact as well as hoof impact to the soil. The increased carbon and



nutrients to the soil resulted in an explosion of diversity as well as an increase in the quality of available forage for the livestock. This successful trial re-enforces the need to promote the practice of animal impact in order to improve the land, especially in heavier clay soils.

a total of 908 kg/ha of available forage to the livestock.

Tree density: The average woody tree density is 519 TE/ha.

Biodiversity: The grass and bush component is made up of 23 and 13 species, respectively. The Biodiversity Index of the farm is a good value (0.7), which indicates little dominance of the grasses and shrubs growing on the farm.



MONEY-MAKING **POTENTIAL OF THE FARM**

An average of 72% cattle calving has been achieved over the ten-year period. The live weight produced on the farm since 2015 is 4 kg/ha.



Ecological and financial resilience during and after the 2019 drought. Destocking of the core cattle herd was necessary (from 23 kg/ha to 6 kg/ha) due to a high congregation of game on the farm, but numbers are recovering fast.



KEY TIPS FROM THE FARMER

- 1. Cows with the right potential will adapt to the area.
- 2. Move the herd fast in the growing season and slower during the dry season. The daily focus must be on animal performance to ensure a good calving rate as well as good quantity and quality of meat for sale.
- 3. Losses to theft and predators must be minimised. In areas with game, herd livestock with dogs and use small mobile electric-fenced kraals at night.
- 4. Herders' needs must be met.
- 5. Daily, monthly and annual bonuses 📴 for the herders are important to ensure that the job is well done.
- 6. Diversify your income sources.
- 7. Follow your mission. Farm Krumhuk's mission is to transform the traditional Namibian way of farming into a modern community-based farming business with a strong focus on social development.
- 8. Get the people to know and trust your brand.

CHOICE OF ANIMAL/S

Although farming began with Simmentaler breeds, it was later shifted to using Nguni with Bonsmara bulls. Currently, only Nguni bulls are used.

The Nguni bulls remain with the single herd all year round, which results in two natural calving seasons. The majority of calves are born between January and March and a second, smaller number are born in June and July each year. High losses to predators resulted in the



adoption of a planned grazing and combined herding approach, with 80x80-metre electric-fenced mobile overnight camps, herders with mobile accommodation, and Anatolian dogs to assist with deterring predators further.

CASE STUDY SUMMARY Farm Tsuwandes: High da

High density with fast moves in rainfall season; cattle and goats



Frank and Katrin Bockmühl run the family farm in the dry north western part of Namibia on a part-time basis. Farming here requires a determined mindset. Regenerating the soil landscape is the guiding principle, but when there is no rain, there is no growth.

FARM FACTS

DESCRIPTION: Mopane and Thornveld Savannah.

ENTERPRISE: Cattle and goats (3600 ha) and game (1400 ha).

PROPERTY SIZE: 5001 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Dry north west with some bush encroachment.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average (from 1934 to date): 290 mm; lowest: 87 mm; highest: 932 mm.

ELEVATION: 1200 metres above sea level.

OWNED OR RENTED: Owned; part-time management.

MOTIVATION FOR CHANGE AND APPROACH: The dry and variable nature of the rainfall necessitated the adaptations.

MAIN INNOVATION: To farm with small- to medium-frame farmadapted animals and to use high density fast moves during the rainfall season and slower moves during the dry season.

KEY RESULTS

• From 1993 to 2013, the stocking rate increased continuously from 3.2 kg/ha to 12 kg/ha (200 cattle, 120 sheep, 100 goats), before the 2013-2019 drought period began.

The farm is situated 50 km west of Outjo.

- The stocking rate decreased to 5 kg/ha during the 2013-2019 drought period. However, the core goat and cattle herds survived this seven-year drought (the worst since 1930) and are recovering fast. Herd building is underway. In all previous extended droughts, the stocking rate decreased to zero and a restart was necessary.
- Bare patches have started to close over and perennial grasses (Bloubuffel and *Anthephora spp.*) are returning.
- Since 2000, a natural die-back of several encroaching woody species is occurring, including *Acacia reficiens*, *Terminalia prunioides* and *Dichrostachys cinerea*; however, *Colophospermum mopane* appears to remain unaffected.
- Predator issues have been addressed by herding small stock during the day and kraaling them every night. Calves are kraaled for four months every night.

Description	Before innovation	After innovation
Number of camps	25 camps (5001 ha)	20 camps (3600 ha); 5 camps allocated to game exclusively.
Number of camps per	Unplanned, continuous or	7 camps (breeding herd)
herd	periodic use.	13 camps (bulls, weaners, oxen)
Time spent in a camp	Unplanned, continuous or	Growing season: 10 days in a camp but moved directly after rainfall
	periodic use.	events; can remain for 4 days in a camp at high density.
		Dry season: Depends on forage production; basic guide is 2 weeks
		in a camp and then moved; 2 selections in the non-growing period.
Time spent out of a	Unplanned, continuous or	50 or more days out of a camp during the growing season.
camp (for rest/recovery)	periodic use.	

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 1996 FAST-ROTATION INNOVATION (CATTLE)

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Various encroaching bush species dying off naturally after the seven-year drought. Bare patches are closing over and perennial grasses are slowly returning under this management.



RESILIENCE OF THE FARM

The stocking rate increased to 12 kg/ha over time. However, during the seven-year drought (2013-2019) the core adapted cattle and goat herds reduced to 6 kg/ha, and then rapidly rebuilt to 10 kg/ha by



2022. In previous extended droughts livestock numbers reduced to zero. If the actual area used after the 2021 fire is included, the stocking rates for 2021 and 2022 are 11.5 kg/ha and 13.7 kg/ha, respectively. Previous extended droughts resulted in the total destocking of the farm.

MONEY-MAKING POTENTIAL OF THE FARM

The rainfall patterns illustrate that extended droughts occur every 15 to 20 years. Fast de-stocking and well-adapted animals are necessary requirements in order to survive these adverse conditions. The farm rainfall records demonstrate a 30 mm decline in average annual rainfall since the 1930s.

CHOICE OF ANIMAL/S

In 1993, Frank took over the farm and brought in Bonsmara cows and bulls. Unfortunately, they did not perform well and the cost of lick was prohibitive. All the oxen were sold in 1996. In 2005, the Bonsmara cows were upgraded with Nguni and Sanga bulls of medium to small frame sizes; and in 2010, indigenous goats





(Himba Appels) were introduced. These adaptations were crucial for the survival of his livestock during the recent drought. Bulls and rams run with the herd all year round, which allows for two main calving and lambing seasons. At times, rams are withheld to restrict lambing during dry conditions.

- To farm livestock in areas with extended drought periods and a highly variable rainfall, you must have extremely well-adapted animals of a small to medium frame that are able to utilise the existing browse.
- Indigenous goats from north western Namibia are well adapted and well suited for this type of environment.
- Expect droughts after several good years and react fast.
 Destock early in order to see the core herd through the drought. Plan mainly after the rainy season has ended.
 Constantly observe what is happening to the grass and the animals and interact with your staff.
- In high gradient areas, it is important to manage erosion to keep water on the farm and to grow more forage.
- 5. Manage predators by keeping herd-bound animals, kraaling small stock and calves at night, keeping dogs with the small stock, and appointing good herders.
- Fire in these low and erratic rainfall areas with shallow soil zones is extremely damaging. The rock heats up and kills many established roots. The exposed ground after fire is rendered vulnerable and poor. When a fire breaks out, it needs to be extinguished as swiftly as possible and refrain from deliberate burning practices.

CASE STUDY SUMMARY Farm Dabis (South):



Jörg and Michelle Gaugler's passion is to leave the farm in a better state than they received it. They are building on his father's efforts.

FARM FACTS

DESCRIPTION: Southern Dwarfshrub Savannah.

ENTERPRISE: Organic production of adapted sheep through high density grazing, previously with tourism.

PROPERTY SIZE: 18 716 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Very fertile, diverse geological landscapes; high biodiversity of plant growth.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average: 150 mm; lowest: 25 mm; highest: 283 mm (average over last 10 years: 125 mm).

ELEVATION: 1 370 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: During the drought period in the 1980s, Jorg thought to himself: Should it really be like this? Or should it be easy, like it is described in the Bible? It was a stressful, depressing and heavy time.

MAIN INNOVATION: Breeding highly adapted sheep; high density selective grazing for 3 weeks and recovery period of two years to enable rain independent dwarf shrubs to recover.

High density; two-year recovery; sheep and cattle



The farm is situated 10 km north of Helmeringhausen and 130 km south of Maltahöhe.

KEY RESULTS

- Between 2013 and 2021, the average rainfall was 106 mm and yet the stocking rate remained above 7 kg/ha throughout the nine-year period and rose to 10 kg/ha by 2021.
- Initially, some small camps provided two to three days of grazing for 200 sheep; now, the same small camps support 300 sheep for three weeks.
- Since 1974, the farm's plant health and biodiversity are now in their best condition.
- Ewes weighing 45 kg produce 123% lambs per ewe per year; and lambs are slaughtered at 17 kg (slaughter weight) at 4-4.5 months old.
- During the recent ten-year dry cycle, the farm's resilience has improved: de-stocking was not needed and only a few very old sheep perished.
- Perennial grasses and shrubs increased during the drought.
- A lucrative additional income has been secured by selling veld rams from the farm.
- Lick is only used as an indicator for the grazing quality of the camps and to determine when to move from camps.
- No parasites, therefore no dosing required; no injections (except for two *Brucella* species; and no shepherds required.
- Farming is effective and peaceful.
- Securing the property from predators through electric fencing and stone packing.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2008 INNOVATION

Description	Before innovation	After innovation
Number of camps	54	62
Number of camps per herd	4	20 (3 herds)
Time spent in a camp	6 weeks	3 weeks (drought) to 5 weeks (normal conditions). Moved when lick consumption begins.
Time spent out of a camp (for rest/ recovery)	24 weeks	2 years

Right: Fully-recovered highly palatable shrubs ready for grazing and increased perennial grasses.

Forage for animals: The average amount of available grass and browse in kilograms per hectare is 571 and 296, respectively, giving a total of 867 kg/ha of available forage to the livestock. Tree density: The average woody tree density is 1007 TE/ha.

Biodiversity: The grass and bush component is made up of 22 and 7 species, respectively. The Biodiversity Index of the farm is a medium value (0.5), which indicates that a few species are starting to dominate the grasses and shrubs growing on the farm.

RESILIENCE OF THE FARM



Ecological and financial resilience was achieved during and after the 2019 drought. No destocking of the core sheep herds occurred and a minimum of 7 kg/ha stocking rate was maintained throughout the drought and recovered well since the drought to 10 kg/ha in 2022.





MONEY-MAKING POTENTIAL OF THE FARM



An average of 123% lamb weaning was maintained throughout the nine-year period. This indicates a healthy, viable business.

KEY TIPS FROM THE FARMER

If you farm in an area where shrubs are a major component, like in the south, then consider the following tips:

- 1. Secure your perimeter fence from predators; maintain it.
- 2. Control predator numbers inside the camps to reduce stock losses.
- 3. Reduce the number of herds as much as possible.
- Apply a two-year, rain independent grazing recovery period, which is based on the shrub species.
- Start with animals of quality genetic features (i.e. early maturing and herd-bound traits).
- Remove lambs from the land as soon as possible to allow the ewes to recover. This enables ewes weighing 45 kg to produce 150% lambs per ewe per year; and lambs to be slaughtered at 17 kg (slaughter weight) at 4-4.5 months old.
- 7. Take advantage of peak animal performance through the year. Allow the rams to run with the ewes all year round. This results in approximately 60% of lambs falling in June and the rest through the year, and it affords good cash flow for the business.
- 8. Investigate landscape rehydration in order to keep the water on your land.

CHOICE OF ANIMAL/S



The farm has bred well-adapted, early-maturing animals that require limited input. The current herd is crossbred with approximately 40% Black-headed Persie. They have an easy temperament; do well in droughts; are more efficient eaters; and have a strong herd instinct (i.e. they graze openly during the day but form large groups at night, which helps to deter predators).

CASE STUDY SUMMARY Farm Witpan: High density grazi

High density grazing; sheep and cattle; selective bush control



Danie Visser uses various practices for different conditions. He uses high density, fast moves in the wet season but keeps smaller herds at calving and lambing times. He focuses more on rest, animal performance and the establishment of favoured plants than on fixed timing. When you graze, it is about the animals; when you rest, it is about the plants. Currently, the sheep-cattle ratio is 60:40. As the quantity and quality of the veld improves (more climax grasses), he would like to change the sheep-cattle ratio to 40:60.

FARM FACTS

DESCRIPTION: Southern Kalahari Sandveld.

ENTERPRISE: Cattle and sheep.

PROPERTY SIZE: 8900 hectares.

FUNCTIONAL CLASSIFICATION OF AREA: Kalahari Sandveld with pans and dunes; several encroaching bush species.

AVERAGE ANNUAL RAINFALL: 250 mm.

ELEVATION: 1200 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: Danie began to farm in 2003. Until 2012, a permanent, lightly-stocked selective grazing system was used, with about 50-75 ewes in every camp. In 2012, he realised that this was a big mistake. There was very little variety in the veld, mainly annual grasses and a few unpalatable perennial sub-climax grasses. The animals were in poor condition and it was a struggle to produce good slaughter lambs from the veld.

The farm is situated

65 km north-east

of Aranos.

MAIN INNOVATION: Increasing numbers in a herd; keeping fewer groups of animals; higher density grazing with fast moves; longer rest periods for camps; and using different management tools for different circumstances (conditions).

KEY RESULTS

- Regeneration is taking place in the high-density camps with denser soils.
- Valuable perennial grasses are returning on harder soils.
- Cow pregnancy is an average of 91% and sheep weaning is 90%.
- The high-pressure grazing of big herds on a small section of veld automatically allows for longer periods of rest for the other areas of the farm as well as the areas that have already been grazed.
- The grazing has stimulated the better-quality grasses and the climax grasses, which recuperate relatively quickly with rest.

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2012 INNOVATION

Description	Before innovation	After innovation
Number of camps	44	44 with mobile electric fences, splitting each camp into 2 or 3 camps = 88 or
		132 camps.
Number of camps per herd	1	There are 11 herds; 8 camps per herd in the wet season, and 6 camps per herd
		in the dry season.
Time spent in a camp	Permanently (low	Growing season: 1 to 2 weeks in a camp (depending on rain).
	stocked)	Non-growing season: 1 to 2 months in a camp.
Time spent out of a camp	None	Growing season: Short (49 to 78 days) but variable (depending on growth
(for rest/recovery)		rates).
		Non-growing season: The animals spend less time in poorer camps.



In the summer, Danie endeavours to return livestock to the grazed area at least once to make use of the regrowth.

Mouse plagues and virtually no germination have affected 5000 ha of the farm, mostly on land where highdensity grazing was not practiced. The cause of this is still not clear, because it occurs on all management types.





Mobile electric fences are used to create fast moves at relatively high density.





To save costs, mobile water troughs are used with the mobile electric fence camps.

CHOICE OF ANIMAL/S

Droughtmaster cattle are used. The cows calve from 1 January until 31 March. The calves are weaned, on average, at seven months; the weaker calves are sold. The bulls are sold between 2-2.5 years old.



Breeding cows are sold as they become available.

KEY TIPS FROM THE FARMER

- Make sure you get good advice before making changes. The advice of Ian Mitchell Innes and Louis Du Pisani was very instrumental in helping us to establish a sustainable plan to improve our veld and at the same time have good animal performance.
- 2. Electrify your boundary fence to control what happens inside.
- 3. Farm with well-adapted, early-maturing animals.
- 4. Watch the triangle (hongerholte) on the top left-hand side between the rump and spine to make sure the animals are full before ruminating (it should not be hollow), and make sure the dung is soft with an indented dimple. This ensures good animal performance, which is always your number one priority.
- 5. It was not necessary to use the entire farm with this grazing approach. We were able to start with the best camps and improve these with good management.
- Combine herds to give plants time to recover. However, try to keep grass growing and of good quality by returning to re-graze the camps lightly in the growing season.
- 7. Reduce wildlife numbers.
- 8. Selectively thin areas that need it.
- 9. Use mobile electric fences and mobile water troughs for your camps.
- 10. Rather than erecting permanent camps, install more pipelines.
- 11. Where perennials are returning, camp these areas off to allow their recovery, if needed.
- 12.Pack collected bushes in an around gullies to slow the flow of water and to keep water on your land.
- 13.Aim for an 8/5 package, which means that the animal should look as though you have packed eight kilogrammes of sugar into a five-kilogram bag.
- 14.Sell well-adapted animals as veld bulls and veld rams from the farm.

Dorper, Dorper and Van Rooy cross, and Meatmaster sheep are used. Ewes begin to lamb



from 1 January. The lambs are sold in July and August. The lambs that are born later are sold in January and February. The premium ewe lambs are sold as breeding ewes. Rams are sold at auction for breeding purposes as well as from the farm as veld rams. Farm Witpa



Farm Adrianople: Manual annual

Manual bush removal; high density grazing; sheep and cattle; annual grass production



The farm is situated 50 km south of Aranos.

Paul Kotzé looks at high density, selective grazing from a different perspective. To produce high profits, he uses high density to maintain a low biodiversity based on annual grass. His approach is not based on promoting perennial grass at all.

FARM FACTS

DESCRIPTION: Southern Kalahari Sandveld.

ENTERPRISE: Adapted sheep and cattle on suurgras (*Schmidtia kalahariensis*) with bush-thinning and control.

PROPERTY SIZE: 7315 hectares (23 km long and 1.4-4.4 km wide).

FUNCTIONAL CLASSIFICATION OF AREA: Kalahari dunes and riverine stretches.

AVERAGE ANNUAL RAINFALL AND VARIABILITY: Average (for the last 50 years): 230 mm; lowest: 5 mm (1998/99 season); highest recorded (1999/2000 season): 765 mm.

ELEVATION: 1112 metres above sea level.

OWNED OR RENTED: Owned; full-time management.

MOTIVATION FOR CHANGE AND APPROACH: Paul maintains that farming with perennial Boesmangras (*Stipagrostis uniplumis*) in this particular area is not profitable. During poor rainfall years, it was observed that when the rain fell repeatedly in one area that was grazed every year, the growth of suurgras increased. It was also observed that when an area had been thinned, the growth of suurgras increased dramatically.

MAIN INNOVATION: High density, selective grazing of the suurgras in the wet season. Every year, the excess grass is baled. The aim is to store three years' worth of forage for drought periods. 200-metre strips are being bush-thinned for sheep and cattle production.

KEY RESULTS

- The change from Boesmangras to suurgras has increased the production in sheep and cattle as well as baled resources for drought periods.
- Sheep small stock units (SSU) increased since 2013 from 1934 to 2770 in 2022 and maintained 2028 SSU through the 2019 drought as a result of bush-thinning (which is paid for by the family charcoaling enterprise) and grazing management.
- The percentage of lambing averaged 90% over the last 10 years, with one breeding season per year.
- The use of adapted breeds has enabled low input costs, which have been further reduced through the collection of Camelthorn and *Prosopis* pods for supplementary feeding.
- To reach market weight, sheep are mated only once a year at the optimum time and during optimum body condition, and the lambs are born on to good grazing. This reduces supplementary feeding input costs.
- According to conventional departmental guidelines, the official stocking rate is 1:2.5 ha for small stock and 1:18 for cattle. Paul believes a stocking rate of 1:1 can be achieved with this method with cattle and sheep in bush-thinned strips.

SHAZING MANAGEMENT AF HOACH DEFORE AND AFTER THE 2012 INNOVATION				
Before innovation	After innovation			
28	80			
Sheep: 6 camps per herd	Sheep: 20 camps per herd			
Varied greatly (depending on rainfall and	Wet season: 3-5 days			
grass availability).	Dry season: graze until the grass is finished.			
Varied according to rainfall in the wet	Wet season: 60 days			
season.	Dry season: 2 selections			
	Before innovation 28 Sheep: 6 camps per herd Varied greatly (depending on rainfall and grass availability). Varied according to rainfall in the wet season.			

GRAZING MANAGEMENT APPROACH BEFORE AND AFTER THE 2012 INNOVATION



Before and after bush-thinning. Paul believes that 2000 ewes can graze in a 50-hectare camp for two days and then move to the next camp.

RESILIENCE AND MONEY-MAKING POTENTIAL OF THE FARM



Ecological and financial resilience during and after the 2019 drought. Destocking of the core sheep herds occurred in the 2019 drought and 2050 small stock units were maintained.

CHOICE OF ANIMAL/S

The main aim is to stock adapted sheep and cattle and to keep frame sizes at small to medium. The cattle include 90% polled Bonsmara and Boran crosses.

The ewes are mainly Black-headed Persians crossed with Van Rooys. These ewes are paired with Black-headed Dorper rams to produce slaughter lambs.





- 1. For these conditions, use adapted animals of a small to medium frame size.
- 2. Combine sheep and cattle to increase your stocking rate.
- 3. To increase production, bush-thinning is vital in this area. Each species requires its own plan.
- 4. For Acacia species, cutting and de-stumping by hand is recommended (which can be used for charcoal production); and for Driedoring (*Rhigozum trichotomum*), fire and grazing are being investigated.
- 5. Be careful of using chemicals for bushthinning, as this may affect valuable trees far from where you apply them.
- 6. On Farm Adrianople, the cost of bush-thinning is covered by an accompanying charcoal enterprise, which is managed by a member of the family.
- Do not always believe everything the theory tells you. Do your own calculations regarding what is profitable for you, and make sure that the theory is beneficial to your pocket.
- 8. Work with what you have: trial and test new ideas in your environment and keep a record of figures with regards to their effectiveness. If successful, you can consider upscaling.

An example of how to calculate production per hectare and production efficiency

Cow-ox example

Farm Size	5000 ha							
Calving %	80%							
		Feb-21			Feb-22			
Herd Composition	Number	Live weight (kg)	Total (kg)	Number	Live weight (kg)	Total (kg)		
Cows	150	450	67 500	165	450	74 250		
Bulls	6	750	4 500	6	750	4 500		
Replacement heifers	30	400	12 000	32	400	12 800		
Calves	120	100	12 000	132	100	13 200		
Animals 7-18 months	120	300	36 000	111	300	33 300		
Animals 19-36 months	90	450	40 500	87	450	39 150		
	516	† !	172 500	533	Ţ	177 200		
Livestock bought for the year	Number	Live weight (kg)	Total (kg)	i ————————————————————————————————————	" -			
Bulls	2	750	1 500	I				
Livestock sold for the year	Number	Live weight (kg)	Total (kg)	I				
Bulls	2	750	1 500	I				
Oxen	60	475	28 500	l				
Culled cows	29	455	13 195	I				
Slaughter heifers	30	420	12 600	I				
Total			55 795	l				
		<u>اير</u>						
Production/year (kg live weight)	= Herd mass (Fel	b 22) - Herd mass (Feb	21) - Live wei	ght bought +	- Live weight sold	,		
1	= 177 200 - 172 500 - 1 500 + 55 795							
1	= 58 995 kg li	= 58 995 kg live weight						
Production/ha	= 58 995 kg live / 5 000 ha							
1	= 11.8 kg/ha							
Production efficiency	= Production/ha / Average stocking rate							
1	= 11.8 kg/ha /	= 11.8 kg/ha / (177 200 + 172 500) / 2 /5000 ha						
1	= 11.8 kg/ha	= 11.8 kg/ha / 34.97 kg/ha						
	= 33.7% * (below cow-ox production efficieny benchmark - possible room for improvement)							

Production efficiency benchmarks

Production system

Weaner Production System	± 32%	
Cow-ox Production System	± 37%	*
Weaner-ox Production System	± 45%	

* If your farm's calculation is above the benchmark, this is very good; if it is below the benchmark, this indicates possible room for improvement.

Notes

Contact details

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