The Efficiency of Low Input –
A Case Study

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Situated at the Western border of the typical Kalahari dune landscape but in almost completely flat countryside, Farm Springbockvley is located 180 km southeast of Windhoek. On its 9.500 hectare of predominantly red sand and partially limestone soils, Springbockvley contains open grassland with some shrubs and trees. Only few shallow depressions exist, of which the most prominent one is the name giver to the farm: more than 100 years ago, when the farm was marked out and the house built, many springbuck are said to have lingered around this vley – from Afrikaans "valley" although more in the sense of "pond" – that is fed by a spring and therefore holds semipermanent open water. The long term average rainfall at Springbockvley is 260 mm, with figures differing between 70mm and 460 mm in the last five years (see also Figure 2: Rainfall and Stocking Rate).

The team – building trust

Ekkehard Külbs took over the farming business from his parents in 1989 and since 2004 runs it together with his wife Judith Isele (See Picture 1). Ekkehards father, who bought the farm in 1959, developed it with simplicity and efficiency in mind and managed soil, rangeland and animals conservatively, but with much passion for the whole ecosystem. For better utilization and to establish grazing management, he built up the main part of today's infrastructure on the farm: 60 camps and – as is common in this area of the country – jackal proof fencing along the borders of the farm. After having studied agriculture in Germany, Ekkehard not only continued with the farming approach of his father, but refined it in his years of farming. He started off with attending a course in Holistic Management in 1990. Later, with her background of having studied Organic Agriculture, it was easy for Judith to keep up with Ekkehards holistic approach when she moved from Germany to Namibia to join him on the farm.

Picture 1: Ekkehard Külbs & Judith Isele

On Springbockvley, 4 permanent staff members assist with the tasks. Each of them carries responsibility for one of the four "flerds": a flock of sheep and a herd of cattle combined. Depending on respective distances, the way from the homestead to the animals and to the water points is either done by foot or by car, tractor or motorbike – and Judith passionately uses her horses to do the work in the veld.

Already in the times of Ekkehards parents, long term work relationships have been valued and nurtured. Two retired employees each have worked for more than 20 years here and continue to live on the farm with their families. The employees do some gardening for their own vegetable

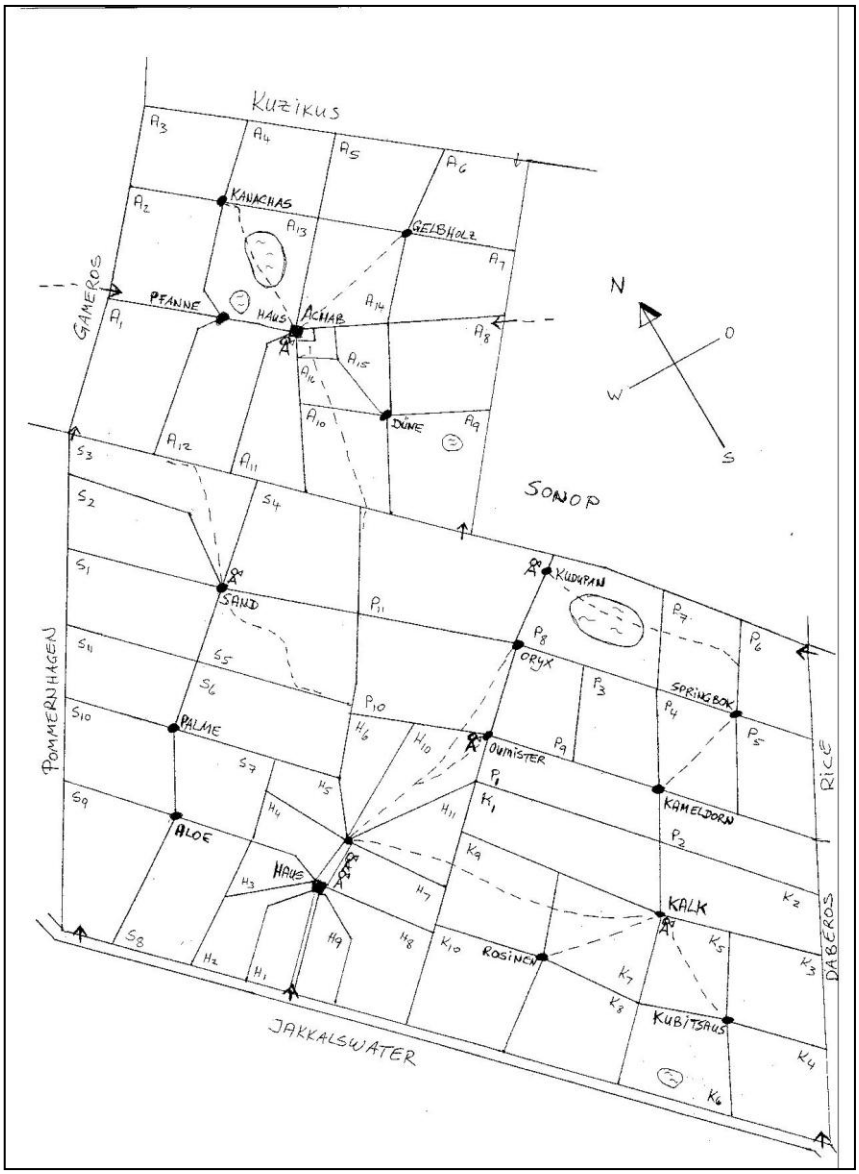
consumption and also have chicken, donkeys, horses and dogs. They are allowed to each keep a limited number of sheep and cattle together with the big flerds in the veld.

To strengthen the wider community in their area, Ekkehard and Judith are always tempted to expand employment and income opportunities.

Animals and Infrastructure – imitating nature

Although most of the development of the infrastructure happened before 1989, the real return from it came through using it differently. The 60 more or less rectangular camps are 160 hectares on average with the extremes being 45 and 330 hectares. There are two handling facilities on the farm and a loading ramp near the farm stead which is located 1.5 km from the public road running along the south-western border of the farm.

Up to 1989 the whole farm was subdivided into 5 cells. In each of the cells one or two flerds were rotating through up to 12 camps according to a strict time table: on fixed days every second week (once a week in the growing season) the animals would be moved from one camp to the next. Animal numbers were kept limited to official stocking rates.



In 1990 Ekkehard started to implement the principles of Holistic Management and many of the financial and grazing planning procedures. He combined herds and started to move them according to a time plan that included the differences in size and quality of each camp. The nutritional needs of the animals at different times of the year were accomodated into the planning to optimize condition and production. Now there are three big cells of 16 to 17 camps each, which contain up to 2000 sheep and 300 cattle. In the fourth cell 11 camps around the farmyard are at the disposal of a smaller flerd with around 500 sheep and 100 cattle.

Figure 1: Springbockvley Farm Map

Each of the 17 water points (reservoir and troughs) is surrounded by 4 – 5 camps (See Figure 1). The 7 boreholes (5 – 25 m deep) are all equipped with windmills, no engines are in operation on the farm, and water gravitates through approximately 25 km of pipeline from centre reservoirs at the boreholes to other water points. The 40mm plastic pipes are buried into the Kalahari sand and are almost maintenance free.

Often, the first limiting factor to keep large herds is to provide for sufficient drinking water. Here, the speed of recharge into the drinking troughs is even more crucial than the amount of water stored in the respective reservoirs. At Springbockvley, the recharge into the troughs is facilitated by gravity feed from the reservoir through short 50 mm diameter pipes, with a ball valve that is situated outside the kraal to prevent damage to it and subsequent leakage. Except during few weeks of the year when wind is scarce, all water reservoirs tend to be permanently full. This way the recharge is fast enough to have 2000 sheep and 300 cattle get their fill comfortably around two troughs of each 3 m long.

Apart from cattle and sheep, approximately 350 springbuck, 100 oryx and varying numbers of kudu and warthog are utilizing what grows on Springbockvley. They are being used for own consumption of venison, or by professional hunters when needed to control numbers. Still, oryx and springbuck have increased substantially in the last 10 to 12 years, after being freed from restriction to only a few “game camps” Ekkehards father had limited them to. They now can roam freely and are easily changing through the gates that are open whenever camps are not occupied by sheep and cattle. Oryx sometimes allow even to be moved between camps, sometimes done to install rest before or after planned grazing by the flerds.

In addition there are duiker, steenbok, aardwolf, bat-eared fox and other small animals as well as predators like African wild cat, cape fox, and the, for sheep farming ever controversial, caracal and black-backed jackal. The movements of latter are closely monitored and whenever moving between the sheep, will be trapped and killed. Still the lamb losses to black-backed jackal and other small predators are accepted to be approximately 5 % annually. Although Ekkehard and Judith would prefer co-existing with jackals, they carry on with the current practice, for the time being, to keep losses down.

Livestock and Vegetation – combining needs

Realizing that well planned grazing and herd dynamics can release ever increasing production potential, Ekkehard and Judith try to adress the factors involved with the helpful tool of weakest-link analysis: no effort whatsoever will advance the dynamic process of growth and production if it does not strenghten the one link in the chain of production that is weakest at the time.

For the time being, Ekkehard and Judith see the limiting factor for progress on Springbockvley still in the ability of the animals to perform on the resources present on the farm. Another factor for limited animal condition on Springbockvley is the very low species diversity of the grasses. 90 % of the grasses are formed by only two relatively narrow leaved species: the perennial stipagrostis uniplumis and the annual schmidtia kalahariensis. With all the emphasis on grazing management over so many years, there are still no easily evident increases to this diversity. This fact challenges the suitability and the efficiency of just these grazing strategies that were thought to have shown some improvement in

the species composition simultaneously. As the biodiversity concern, though, is currently not the weakest link in the chain of production, it could easily develop into it when, for example, a loss in animal condition is experienced, while assuming there would be sufficient fodder available. Judith and Ekkehard see an opportunity to make up for the low diversity with detailed planning to make sure that each of the few grass species are present in different age stages. So here, the relevant aspect responsible for the composition of a good diet would be more the respective state of growth of the existent few grass species and less the presence of a variety of species.

The diversity and the nutritional value of the existing grazing on Springbockvley are tightly related to the condition and the production capability of its animals. In principle, animals and grazing have developed together, so grazing can only be improved together with and through the animals that live on it – and vice versa. Hence, selecting for cattle and sheep that grow well under the prevailing circumstances is the current strategy for Judith and Ekkehard to improve profitability of the farm, rather than following the ever present lure to “buy better genes”. But these animals can only convert the existing resources into produce – and at the same time improve the conditions for growth – when the grazing planning provides for time on both sides: for the animals to be able to select a balanced diet, and for the plants to have sufficient time for recovery.

The average grazing period in the growing season is between four and six days, provided fast growth is observed. These moves also need to take into account other factors of the farming reality: size of camps, quality and quantity of forage and soil condtion in each camp, breeding seasons, vaccinations, weaning, marketing, special treatment of specific areas and problem species.

For each non-growing season, a new schedule of animal moves is drawn up. Generally, grazing periods of seven to twelve days are planned to combine the needs of the animals with the need to prepare the soil surface for the coming rainy season. With the current strategy to rotate through each cell in approximately 180 days, two rounds are done before the next rains are due. So the animals get fresh grazing after 10 to 12 days for almost six months. After this, there is a fair expectation that for the second round, there will be some new food in the camps other than only the left-overs of the first one: pods and leaves that have dropped, and new shoots on perennial grasses or new leaves on the bush after winter. These moves are assumed to be fast enough for the rumen flora not to have to adjust to new conditions with every move to a new camp, but there is still ample “pressure” on the animals in the big flerds to force utilization of less valuable plant material.

Assessment and Planning – producing peace of mind

At the beginning of the non-growing season, the amount and quality of available forage is assessed by taking two to three samples in each camp with the so-called STAC method. This gives a fair and insightful indication of both the amount of grazing available and the condition of the soil. The results from the samplings are being calculated into total forage availble in each camp, each cell and ultimately on the whole farm. These calculations can be cross-checked using the “square estimation”, where the area is visualised and judged that would supply one cattle with sufficient feed for one day. Both Ekkehard and Judith feel confident to build the plan for the whole animal production for the rest of the year on this early assessment. Although it takes some discipline to do the sampling that uses up

most of two to three days walking in the veld, the result is most rewarding of knowing early in the year what to expect and seeing the outcomes of all the decisions and processes of earlier actions.

With the amount of forage assessed, a non-growing season including a drought reserve of together 300 days is planned for; assuming from experience that first growth only occurs at the end of January. Additionally, 10 to 15 Stock Days worth of grazing per hectare are planned as a left-over and to serve as a risk margin for faulty assessment. If uneaten, this plant material will later be available for trampling down to form the vital soil cover that is needed to build soil structure and helps to keep soil moisture losses to evaporation and temperatures low. At the end of the first rotation, a controlling assessment is done to confirm the amounts of fodder available for the second part of the non-growing season. This sampling is not done with the same attention to detail as earlier, but comparing it with the calculation of what the animals have hitherto taken out, gives another confirmation and with it peace of mind.

The need for all this is seen in the motivation to build a grazing plan with the aim “to be at the right place for the right reasons at the right time”. With the use of this plan, Springbockvley has over the years seen a continually increased carrying capacity even with those years in between, where less than a third of the average rainfall was recorded (1995, 1996 and 2007) and some drastic temporary de-stocking had to take place. As is the case in 2010 on Springbockvley, stocking almost 40 kg of live animal mass per hectare (See Figure 2) in the Kalahari Sandveld is much higher than most of the farms in the region are able to achieve.

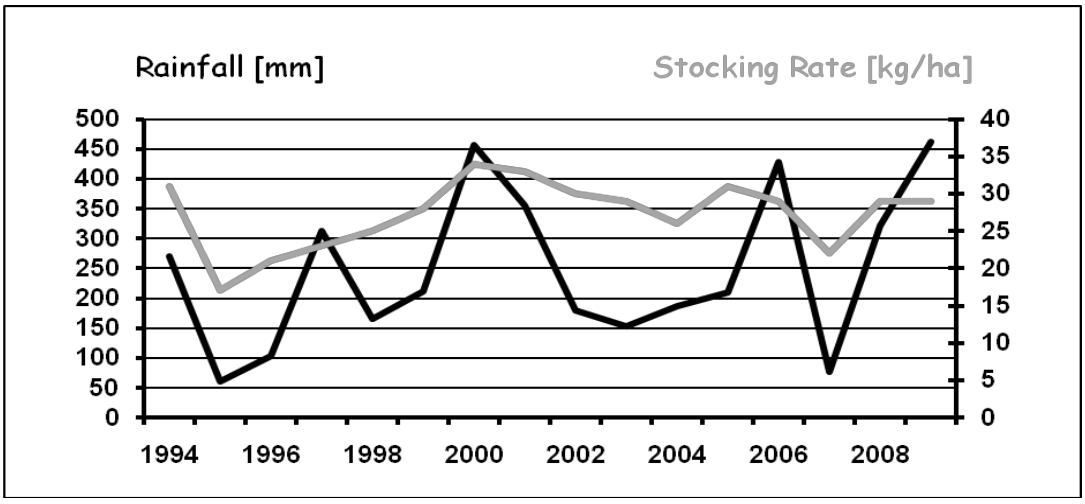


Figure 2: Rainfall and Stocking Rate on Farm Springbockvley 1994 – 2009

Added to a detailed, careful and at the same time ambitious grazing plan, a very important tool for grazing management is animal impact. By combining the five into four large flerds the animals move at higher density and hence closer to each other while grazing and while walking to the water point. This tends to stimulate the animals to eat less selective and at the same time they tend to place their hooves more randomly to trample down brittle plant matter that is so valuable for growth and soil. What is important for the trampling effect, though, is in the first place the amount of hooves per area and not the type and weight of the specific animals. On the soft soils of Springbockvley, the sheep do a tremendous work. Only when it comes to breaking down the harder perennial grasses, it gets

obvious that animal density alone is still not enough to really make a difference here. Higher numbers, even tighter densities of cattle and a change in the behaviour of the animals to install herd effect, where the hooves are placed randomly and with force, will bring about new levels of healthy "disturbance" to the soil. In the average 160 hectare camp, the calculated density may be averaging 15 animals on one hectare (with extremes of 7 animals per hectare in the 330 hectare camp to 50 animals per hectare for the 45 hectare camp). In reality, though, tighter densities are well achieved, as the animals are not evenly spread over the whole camp but usually tend to bunch together.

Smaller Frame – decreasing inputs

Ekkehard in 1989 took over the livestock from his parents: 250 Simmentaler cattle and 3000 Karakul sheep. By 2010 the number has risen to about 700 Nguni cattle and 5000 Damara sheep.

Due to ever falling prices and the fact that he had no passion for the the Karakul business, he soon introduced Damara rams to the Karakul flock, building on the adaptation of the existing ewes. The Damara sheep (See Picture 2) fit well into the prevailing system, because they are adapted to the climatic and nutritious circumstances of the area and have good mothering abilities. Similar to the Karakul, they have strong herd instincts and hence function well in big flocks. Additionally to the rams introduced during the first years, Ekkehard occasionally bought some small Damara flocks to speed up the replacement process.

Picture 2: Flock of Damara Sheep, June 2010

With the cattle, he realized that the large framed Simmentaler struggled to perform optimally in the low diversity, Kalahari sand conditions as soon as stocking rates increased. For the first few years he crossbred with Afrikaner bulls, but which did not give the desired results of maintained reproduction. Although the crossbred animals gained acceptable carcass grades at the abattoir, they still were large framed and not able to use the available fodder efficiently – the higher the stocking rate, the longer the inter-calving periods became, with at the same time persistently unused perennial grasses.

Picture 3: Nguni Cows with Calves, June 2010

In 1994 Ekkehard introduced Nguni bulls to the mixed Simmentaler-Afrikaner herd and over the last 15 years the animals developed into a compact medium frame size (See Picture 3). This allows for more numbers of animals to be fed on the available land with maintained reproduction that adds up to significantly increased production and hence profitability.

Even with the above mentioned bigger flerds and animal densities, cattle and sheep do not bother each other in the same camp. They rather perfectly complement each other not only in their daily routines but also in their diet and their grazing habits. While the sheep come to the water point early mornings and late afternoons and quickly return into the veld, the cattle hang around the water point to drink, rest, and ruminate characteristically from late morning until early afternoon. And while a very important part of the sustenance of the sheep are leaves, flowers, pods, and berries of bushes – they are browsers apparently to an extent up to 60 % of their diet – as well as herbs and small leaves and spikes of grasses, the cattle mainly eat most parts of more fibrous grass plants with a small addition of the sheep's diet. This means that even while being fully stocked with sheep, there would still be space and fodder for cattle to produce on, and vice versa. Due to the fact that the habitat on Springbockvley consists of a limited number of bushes and contains a lot of open grassland, a number of 5000 sheep currently seems to be the upper limit to be supplied with sufficient amounts of suitable fodder.

Farming with these two indigenous breeds – Ngunis and Damaras – achieves remarkable production per hectare at Springbockvley. The annual meat production since 2000 is on average 11 kg / hectare with a maximum of 14.8 kg per hectare in 2003. The meat production constitutes more than one third of the stocking rate since 1995, which compares well even with areas of higher production capacities (See Figure 3).

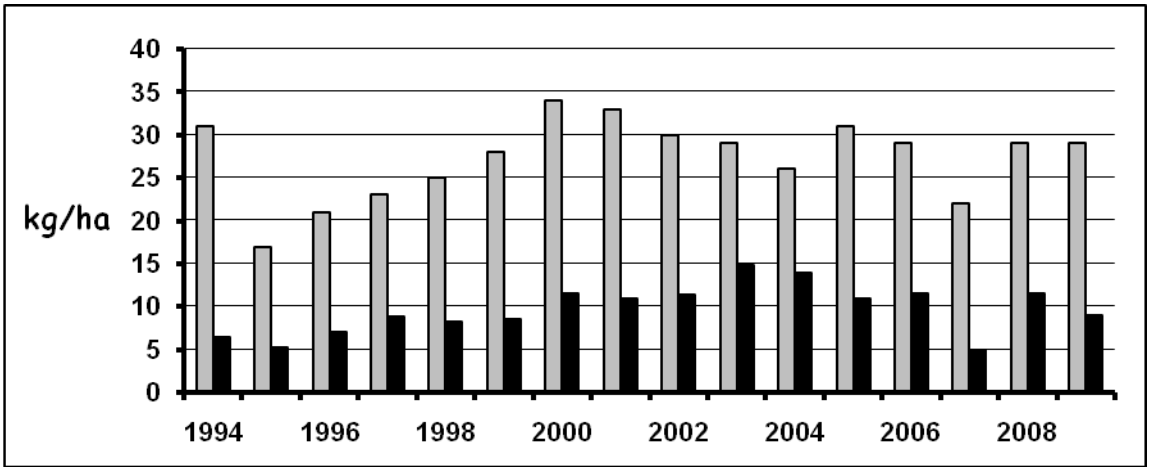


Figure 3: Stocking Rate (grey) and Meat Production (black) on Farm Springbockvley 1994 – 2009

Selection – breeding well adapted animals

But it was not just the mere change to the smaller indigenous breeds that brought about this difference. It would not have had the mentioned success if it had not been combined with a strict and consequent selection of animals from within the herd. Ekkehard and Judith aim for healthy, low input production abilities under the given environmental circumstances.

The first priority in the cattle selection process is high and early fertility – meaning every cow has to give birth at the latest at an age of 2.5 years and from then on every year. Animals who fail to reach this objective will be culled. Calving ease, mothering abilities, milk production, growth of the calves and phenotypical characteristics – according to Lasaters motto “form follows function” – are other criteria that are included when selecting heifers or culling cows. With two calving periods per year – summer: November to January and winter: May to July – the system of serving heifers at around 18 months can easily be achieved.

With the sheep a very low input management is maintained. Rams are kept in the flock throughout the year – only in years with low fodder quantities or qualities will they be taken out to prevent lambing between September and December. Female lambs are not actively weaned, which provides for a secure place in the instituted hierarchy of the home flock that keep them bonded and calm. Only the male lambs are sorted out after they have weaned themselves from their mothers, to be kept in a separate flock until ready for sale. Once to twice a year young ewes that did not reproduce within two years of age are culled; as well as all those ewes that have not reconceived or lost their lambs. As male lambs are not castrated there is a broad opportunity to select for own breeding rams. During the last years, consequently most breeding rams originated from the own flock and many have been sold to other farmers.

The aim is to produce meat from the available natural resources with least possible external input. Supplementation is kept to a minimum. In fact, the sheep get no licks at all, as the design of the lick troughs that supply to the cattle prevent sheep to reach its contents. Through their browsing of valuable bush components the Damara sheep sufficiently meet their mineral necessities.

The cattle are given minimum amounts of a self-mixed lick to compensate for mineral shortcomings in the growing season and to stimulate digestion of the dry grasses holding high fibre contents during the winter. Licks are containing phosphate and salt plus sulphur in summer; salt, urea, molasses and maize bran in the non-growing season.

With the ongoing strength of grazing planning and selecting adapted cattle, Ekkehard and Judith are planning to simplify lick composition, reduce lick amounts, and replace urea through natural protein resources. This is not only to reinforce the use of the natural resources but also with regard to the vision to possibly switch to certified organic meat production in the near future.

Animal Handling – reducing frequency and stress

Working the animals in kraals or in the crush is kept to a minimum at Springbockvley. All the cattle have to go through the crush once a year, though, for compulsory vaccinations. Furthermore, the cattle are only worked through the handling facilities before leaving the farm for weighing, branding and ear tagging; to ear tag those heifers that are selected to be bred; or for branding, castrating, dehorning and tagging of calves. No routine of pregnancy testing or scheduled animal weighing exists, neither are general treatments like dosing, other vaccinations and parasite control needed. During calving season new born calves are regularly ear tagged to be linked to the tag number of the mother.

With the sheep, there is almost no work except the regular sorting and tagging three to four times a year. They are in fact never treated, except for individual cases, when ticks cause obvious pain and injury. The grazing management makes this possible: by staying in a camp for not longer than 5 to 14 days (depending on temperature and moisture) and not returning earlier than 60 days, breeding cycles of internal and external parasites are broken and the animals can handle the remaining pressure.

The bigger the flerds, the more difficult they are to handle. As a result, it gets more important to find ways and means to practice calm and firm animal handling; and to make sure all involved parties do not get frightened and stressed. For this reason Ekkehard and Judith, together with their staff, have attended courses in and practice low stress stockmanship. This involves all the tasks to be done with the animals and not against them, while refraining from using sticks, shouts, frightening gestures, and pressure. Rather using the release of pressure in its place and working both herds and flocks from the side instead of from the back, continues to make the work with the animals on Springbockvley a pleasant experience for both people and animals. Consequently, animal behaviour changes due to different handling. Not only to share their experience and skills, but also because they assumed a need in the country, Judith and Ekkehard started to offer courses in Low Stress Livestock Handling for other farmers and their employees either on their respective farms or at Springbockvley.

Management of the Whole – keeping it simple and efficient

A big part of the daily life at Springbockvley is to keep the feedback loop running, as not only the planning for healthy finances and grazing etc. needs to take place, but monitoring and controlling need to show where aims are not met. Consequently, a big part of the farming routine work consists of controlling tasks. A lot of time is spent for checking border fences and all flerds are visited and checked for wellbeing, efficient water and lick supply at least every second day.

Apart from the high time input in the above mentioned management tasks, the setup on the whole farm is consciously kept as simple as possible, clear, and efficient. This was just as well the mindset of Ekkehards parents and was continued by Ekkehard, ever being refined over the years. Both technically and financially only low inputs are involved. Moreover, Ekkehard and Judith try to be self sustaining in many ways as far as possible and to rely on regenerative energies. All the boreholes are equipped with windmills that assure low maintenance. The electrical power is supplied from an efficient solar system. Their garden supplies a variety of vegetable and fruits for fresh consumption and for preservation for the rest of the year. They bake their own bread, hunt springbuck and oryx for fresh and smoked meat or salami. Judith processes milk from their cows into yoghurt and different cheeses.

According to the regime that, while maintaining income, “controlling costs produces profit” both in their personal lives and in the farming business, they consider consciously before buying a product: is it really necessary and worthwhile and what is the reward of it? With this approach in combination with all the discussed management factors, the farming business at Springbockvley is highly profitable. Ekkehard and Judith were able to achieve a continually increasing farming income with almost stable levels of farming expenses that do not make up more than approximately one third of the income since 2000 (See Figure 4).

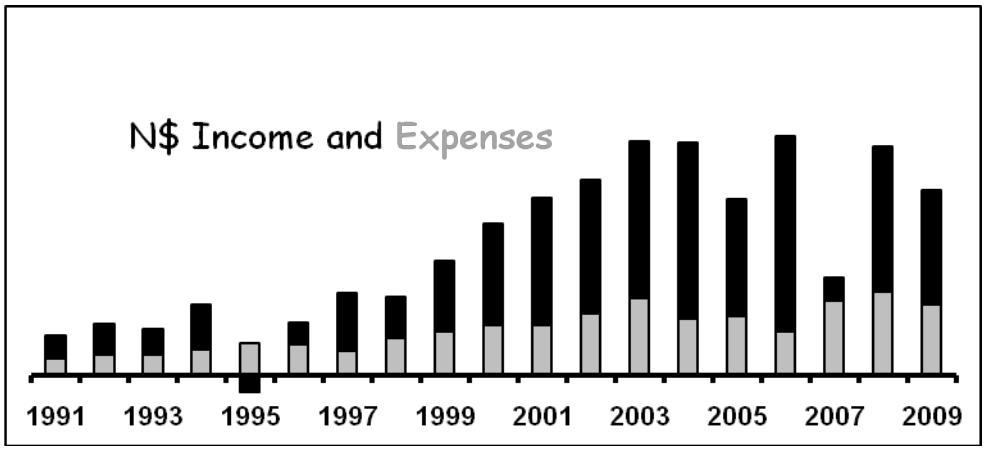


Figure 4: Farming Expenses as Part of Farming Income on Farm Springbockvley 1991 – 2009

More than once, the living and managing approach at Springbockvley have been depicted by fellow farmers as being simple or even minimalist. Ekkehard and Judith take this as a compliment and they enjoy the fascination of the efficiency and of this way to live with and through agri – culture.

They are involved in different projects and actions to support sound agriculture and are happy to be an integrated, active part of the Namibian community. They feel confident to share "riding the front wave" of some pioneering steps that are currently undertaken around sustainable agricultural progress. They have carried the responsibilities for the Namibia Centre for Holistic Management for many years and participate actively in different mentorship programmes. They are founding and board members as well as lecturers at the Agricultural Training Centre Krumhuk. They are part of a lively management club, and are always open to discussion and dailogue and available for personal consultations.

Ekkehard and Judith value doing most things together, as they consider their relationship (together with the closeness to their friends and to Ekkehards two sons) their primary source of joy and motivation.

In essence, farming might be a profession like any other. But sustainable, holistic, or organic approaches in agriculture often require even deeper knowledge and more skills around the processes of the whole ecosystem and the understanding of their interconnectedness.

Going beyond practicing, a profession can be transformed into something even more profound. Understanding this, sustainable agriculture, livestock production, and rangeland management are, for Ekkehard and Judith, "more than a profession, but a way of life".