FRAME SIZE, MANAGEMENT AND PROFITABILITY

INTRODUCTION

An opportunity is only an opportunity when it is grasped by those to whom it applies. In the past beef was produced and marketed in the presence of a safety net in the form of the floor price. In general the farmer produced and another marketed and the weaned calf system is not much different. The current agricultural environment has challenged that approach and the beef producer should consider engaging the market directly themselves and compete for the best possible price to maximise income.

Farming regions differ from one another and large parts of South Africa are ideal, or even exclusively suited to, extensive livestock production (70%+). Climatalogical limitations, particularly low and erratic rainfall and high temperature, are the most important reasons for this. Periodic and seasonal droughts are the rule rather than the exception, especially in the more western parts of the country and the climate appears to be changing. In order to optimize livestock production in these areas the choice of cattle breed, relating specifically frame size, is of utmost importance because the feed production potential of the veld is limited. To ensure production the cattle have to be adapted to the environment in which they are to be managed. The big, late carcass-maturing breeds developed in Europe where climate, in terms of rainfall (plentiful and well distributed) and temperature (mild) ensure good grazing, is optimal. Large frame animals thrive in such conditions but when fodder becomes a limitation and where temperatures are high the large frame animal tends to be less able to cope because a larger amount of the ingested feed is required for maintenance and the control of the internal environment. In countries and regions, such as parts of the Asian and African continents, where climate tends to limit feed production (quantities limited by drought, quality compromised by temperature), the adapted cattle breeds tend to be smaller and have early-maturing carcasses as these adaptations allows them to limit maintenance requirements, leaving more nutrients for the production function.

In the more arid areas fodder quality is often very good, even during winter, but quantity is a limitation, resulting in carrying capacities ranging from 8 to 18 ha LSU^{-1}. Animals are adapted when they are able to maintain high levels of reproduction and production in a harsh environment, without additional inputs.

When we say that present opportunities must be used we must first be convinced that there are opportunities to be had. My take is an unambiguous “yes”. There are various opportunities to be considered but this presentation is focusing on frame size, management and profitability in the production of **“organic beef”**.

BEEF PRODUCTION

Global trends, consumer preferences and disease outbreaks are all outside the control of the individual farmer while there are a number of beef production aspects that are controllable. The beef producer must make sure that the controllable elements of the enterprise on the farm are in order before tackling the greater issues that need collective endeavours. In beef production three main aspects are under the control of the farmer, namely:

- **Productivity**: linked directly to reproduction that receives a lot of attention.
- **Animal health**: increasingly under the farmer's control and responsibility – don't try to save here and keep record of all that is done.
- **Marketing**: primarily determines the production system to be implemented which is, in turn, dependant on the following inter-related factors:
  * Environment (climate/risk)
  * Frame size (suitability)
  * Nutrition (quantity/quality)
  * Lick supplements (nutrient deficiencies)
  * Input costs (contained)

Decisions taken in a beef production enterprise have some medium term consequences but mainly long-term consequences. Production systems cannot be changed within a short period of time.

ENVIRONMENT

Environment determines to a large extent the production system (marketing age) that should be followed in a given area to maximise profit without destroying the resource base. The animals should be adapted to the production environment rather trying to adapt the environment to the animals. In Table 1 a gross margin comparison is made between herds in a weaned calf production system wintered at different levels of intensification as measured by supplemental winter feeding.

Table 1: Gross margin of beef cattle wintered in different ways.

	Wintering system [1)]		
	Intensive	**Semi-intensive**	**Extensive**
ha^{-1}	114.18	100.97	178.40
LSU^{-1}	643.82	729.98	1787.46
cow^{-1}	622.63	709.46	1760.00

1) Intensive - Maize silage, Smuts finger hay
Semi intensive - Maize crop residues, Smuts finger hay and - Foggage
Extensive - Rested veld.

Feeds, licks and animal health were the main cost-drivers used in the calculation of the margins. It is clear that weaned calf production is cheaper in extensive systems as compared to more intensive systems. Results indicate that cultivated pastures cannot be used by a breeding herd, economically speaking. The fodder source should rather be utilised by growing animals, whether they be replacement heifers or bulls or steers and heifers for fattening.

The more limiting the environment is which is quite common in South Africa, the more the farmer should seek ways to ameliorate the risk but it is not feasible to create a favourable environment in the current economic climate.

Weaned calf production

Currently a very large percentage of beef producers are weaned calf producers – they are producing the "raw material" while somebody else picks the fruits by "processing" the calves into beef that the consumer buys. The calf feeders prescribe to the farmers how the calf must look – it has to weigh between 180 to 220 kg at 7 months (irrespective of where the calf comes from – the KZN Midlands to the arid Bushveld - how this is achieved is the farmer's look-out). The result is the constant search for ideal genetics or interventions (different breeds, different crosses, supplemental feeding, licks, growth promotants and stimulants, etc) to produce that which the market wants. All these are factors that let production costs spiral upward.

Furthermore the feeder determines the price that varies with season, demand, supply, weight, breed of calf and even the maize price. In this way it is the producer who has to fill the price gap while the product being delivered does not change. The weaned calf producer carries the production environment risk, including the large breeding herd needed to produce the calves.

Tollies

Tollies are marketed between 15 to 18 months and attain A-classifications. This can be a low input approach and fattening can be done on cultivated pastures or veld. Here is an opportunity to produce that which the consumer demands while simultaneously participating in the beef market directly. Input costs, especially on veld, are lower and in that way risk is spread. If weaned calf prices do become high the option is always there to sell the animals, even at 9 to 10 months of age. During times of fodder shortage the steers can be off-loaded to ensure there is feed for the breeding herd.

Successful fattening under these circumstances with a low input approach does, however, require the correct genetics as shown by the research results of trials at Potchefstroom. It is essential to utilise small to medium frame breeds/types as they are more suited to the system. An important aspect is that the animal is able to deposit fat without requiring additional feeds. Early carcass maturity is therefore important and it can be obtained from small framed, early maturing breeds such as the Nguni.

Table 2: Afrikaner steer performance on Smuts finger pasture during the summer

	Year 1	Year 2	LF
Starting mass (kg)	215	207	293
End mass (kg)	315	319	456
Grazing period (days)	136	148	166
ADG (kg)	0,730	0,755	0,988
Mass gain (kg ha^{-1})	300	270	295
Carcass mass (kg)	153	163	236
Dressing (%)	48,5	51,1	51,3
Classification	9,3 (A1)	11,0 (A2)	7,6 (A0)

Large frame steers only achieved an A0 classification under the same conditions. Although the individual performance of the large frame animals is "better" (0.988 vs. 0.742 kg/day), production ha^{-1} is identical because there are more small frame steers on a given surface area and the small frame animals are slaughter ready. Again it illustrates that looking at individual performance does not give the entire picture.

Similar results were obtained on veld but the veld has to be in a good condition and there has to be sufficient grazing material.

Heifers tend to have slower daily gains but finish sooner than steers, i.e. achieve the desired fat layering at a lower mass. However, there is considerable demand for good quality female animals and heifers can therefore be grown out, exposed to a bull and sold as pregnant heifers as long as the prices remain realistic.

Oxen

Marketing of oxen may occur at any stage following the usual tolly age but it is usually between 27 and 33 months. They then often classify as AB or even B carcasses. Indigenous breeds tend to shed teeth later than exotic breeds. In this system the emphasis is more on the production of weight $unit^{-1}$ rather than the number of units. The system is suitable to high risk areas and even makes provision for a level of speculation with the buying in or selling of animals. A breeding herd can still form part of the enterprise or the system may be an exclusively ox system, obtaining oxen from other breeders. Genetics remain an important aspect as large animals still struggle to finish on low input systems (and oxen tend to get larger than their intact counterparts). Small frame breeds or their crosses are ideal for this type of system.

Table 3 provides a comparison between different age groups of cattle based on prices obtained from the Landbou.com website (21 May 2013).

Table 3: Beef carcass income comparison for different age categories.

	Age category^{-1}			
	A	**AB**	**B**	**C**
Age (months)	<18	>18 <24	<33	>33
Carcass weight (kg)	200	240	280	380
R/kg	28.15	26.62	23.93	22.23
R/carcass	5 630.00	6 388.8	6 700.40	8 447.40

$^{-1}$: It must be remembered that indigenous cattle tend shed teeth later than these ranges and therefore remain in an age category longer than other breeds.

Although the price kg^{-1} decreases as the age increases the value of the carcass increases because a heavier carcass is produced.

FRAME SIZE

Frame size refers to the linear dimensions of an animal in terms of height as measured at the shoulder. The frame size of an animal is directly linked to the carcass maturity of the animal. Small frame breeds of cattle tend to have early carcass maturity in terms of degree of finish required for optimal classification while large frame animals tend to take longer under the same nutritional circumstances. In reality this implies that the small frame animal starts depositing fat at a lighter weight while the large frame animal has to be considerably heavier before fat deposition occurs. It is this aspect that makes it possible for small frame animals to fatten on low input systems such as cultivated pasture or good veld. In a similar way the attainment of puberty is a function of mass rather than time and small frame animals reach sexual maturity at a relatively early age due to the attainment of the required body mass.

In general it can be said that large frame animals grow faster for a longer period of time to attain a higher end mass than small frame animals. If attention is given to the economically important factors, specifically under extensive production circumstances, it is also true that large frame animals take longer to fatten as they require more feed day^{-1} in order to maintain themselves and to perform the production function than small frame animals. What is often not acknowledged is the fact that at the same stage of finishing the efficiency of feed conversion is the same between large and small frame animals. Comparisons between breeds in growth tests are misleading because small frame animals that are receiving the same feed for the same period of time as large frame animals are at a physiologically more advanced stage of development than the large frame animals and this then gives a skewed impression of the small framed animal's performance. Small frame animals have already started finishing off (depositing fat) while the large frame animal is still in a primarily muscle growth phase so different physiological processes are being compared which is incorrect. Energy requirement (and therefore feed) to deposit fat is more than twice as high as for muscle growth. These higher requirements for the fat deposition translate into so called poor daily gains and feed conversion values for the small frame breeds. What should be done is that the small frame breeds should be fed the right ration to allow them to exploit their full potential, i.e. lower input feed that allows them to deposit fat later and therefore produce heavier carcasses. These concepts are demonstrated in Table 4.

Table 4: Frame size and feed conversion (Meissner, 1983) and body weight to produce A2 and A3 carcasses (Naude, 1981).

Frame size	Feed conversion (kg feed/kg gain)		Live mass (kg)	
	250 - 400 kg	3 - 7 mm fat	3 mm fat	7 mm fat
Larget	6.76	6.53	388	?
Medium	7.65	6.46	336	442
Small	8.34	6.39	262	374

When mass is used as the only comparison there is considerable variation between frame sizes with regard to feed conversion (column 2), mainly because large frame animals are younger and have less fat at a given weight between 250 and 400 kg. However, when different frame sizes are fed to the same level of finishing

(fat deposition) there is very little difference in feed conversion (column 3) and it is even slightly in favour of the small frame breeds. Large frame animals weigh 388 kg already by the time they have 3 mm subcutaneous fat, in contrast to small frame animals that only weigh 262 kg at the same level of finishing. When small frame animals weigh 374 kg they already have 7 mm subcutaneous fat. The study from which the data comes did not feed large frame animals to 7 mm subcutaneous fat but they would have weighed more than 500 kg should it have been done. If mass is the only measure of performance when determining feed conversion ratio between 250 en 400 kg it is understandable that the large frame animals return better feed conversion as they are only starting to deposit fat while the small frame animals are already slaughter ready in terms of fat covering. This trial was conducted in an intensive system. The principles would be the same in a grazing system with the exception that fat deposition would be delayed for both small and large frame animals allowing carcasses to become heavier in both instances. It is about horses for courses – large frame ideal for intensive systems, small frame ideal for less intensive systems. When comparing small frame cattle performance in a feedlot to large frame cattle performance you are not comparing on an equal footing and it naturally places the small frame animal in a poor light.

Unfortunately the beef market is so feedlot oriented that some producers try everything to make the animal suitable for that marketing system and traditionally small frame breeds run the risk of becoming large frame breeds through stringent selection for feedlot type growth performance. The genetic diversity is present in each breed for the breeder to select for larger animals but in the process the cows also become bigger. This gives rise to certain outcomes as illustrated in Table 5.

Table 5: Dry matter intake (DMI) of grazing, lactating medium frame cows with different weights (Meissner, 1983)

Cow weight (kg)	DMI (kg)	Cows/area	Weaning weight/cow
450	11.3	100	200
500	12.2	93	215
550	13.0	87	230

As cow weight increases with continued selection for heavier weaning weight within the herd, fodder requirements also increase and fewer cows can be managed on a given area to prevent overgrazing. The weaning mass of the calves has to increase to ensure that the same production is realised from the given area of land. Within breed context growth and reproduction are negatively correlated. This means that where selection focuses only, or even predominantly, on growth the herd will lose fertility over time. Selection for growth influences growth from conception to adulthood meaning that birth weight also increases and with it the potential for dystocia which is not advantageous in extensive production systems. Small frame breeds are generally renowned for ease of calving which is essential to optimise calf production.

Irrespective of the breed or frame size of an animal all cattle have, as percentage of the carcass at the same fatness, approximately 71% saleable meat (muscle) and 44.5% expensive cuts (hind quarter). There is not one breed that carries more meat than another. What may differ between individual animals is muscling

which may improve the percentage of saleable meat fractionally but even this is often negated by the fact that heavier muscling is accompanied by coarser bone structure.

In summary, larger framed animals have higher maintenance requirements per unit than small frame animals and trials at Potchefstroom have indicated that large frame animals require 28% more grazing than small frame animals on a kilogram for kilogram basis.

Numerically speaking it must be remembered that more small-frame animals can be managed on a given area than large frame animals and this was demonstrated by a trial at Potchefstroom when comparing small and large frame breeds in an extensive weaned calf production system as shown in Table 6.

Table 6: Gross margin of different frame size beef cows in an extensive system

	Frame size	
R	**Small**	**Large**
ha^{-1}	178.4	156.85
LSU^{-1}	1787.46	1 571.78
Cow^{-1}	1 760.00	2 168 67

When frame sizes are compared on an equitable basis the advantage lies with the small frame animal under extensive ranching conditions because more cattle are kept on a given area. Comparisons are often made on a per cow basis which does not consider the differences in weight, maintenance requirements, etc. In more intensive systems the pendulum swings in favour of the large frame animal but the magnitude is not overwhelming. Values in Table 1, however, illustrated that intensive systems tend to be generally less profitable due to high input costs.

NUTRITION

Lick trials at Potchefstroom demonstrated that large frame cows use double the amount of lick supplements compared to small frame (indigenous) cows on a per capita basis when grazing comparable veld. The large frame cattle give birth to heavier calves and also wean heavier calves and that requires nutrients. In areas where nutrients are limited due to quantity or quality the lick consumption increases to enable the large frame animals to continue producing.

Many breeders tend to use large frame bulls on small frame cows to produce a heavier weaned calf. This is a good practice as the progeny would be suitable for both types of fattening, extensive and intensive. It is important to note that female progeny should not be kept as replacements as they will grow larger than their dams which will require cow numbers to be adjusted downward.

Licks are often used to try and correct other problems in the management system but this is not cost effective as shown in Table 7

Table 7: A comparison between mineral and production licks for lactating cows.

	Mineral lick	Production lick
Intake (g/cow/day)	80	777
Cost (c/cow/day)	41.8	2.90
Weaning weight (kg)	184	185
Cow weight (kg)	477	493
Conception (%)	80,7	80,6

No economically important performance measure was improved by the provision of the production lick. It must be said that these cattle were on good veld, stocked according to its grazing capacity. Performance can be enhanced through correct veld management without increasing input costs. However, do not try to save on essential lick ingredients either – licks should provide those nutrients that are deficient in the main feed source.

INPUT COSTS

The input cost pincher is widely known and is simply illustrated in Table 8.

Table 8: Input cost pincher in agriculture

	Year	
	1984	2013
Vehicle price (R)	30 000	450 000
Weaned calf price (R)	500	3 410
Weaned calves/vehicle	60	132

The RPO recently made a calculation relating to input costs and noted that while meat prices moved horizontally between April 2012 and April 2013 (with some serious dips in between) inputs costs rose by 19% year on year. The result is that it is increasingly difficult for the beef producer to be competitive in the market and input costs have to be reduced.

However, it is difficult and perhaps ill informed to try and save on certain input costs such as animal health and essential supplementation. Input costs can rather be reduced by extensification of beef production systems, from the calf through to the slaughter ready product. By making use of breeds suited and adapted to extensive production systems some savings can be effected on dip and dosing medicines. Non-adapted animals increase input costs.

Bull power is often neglected, specifically by commercial beef producers. Often it is the input where attempts are made to save some money. It is of cardinal importance to purchase the best bull that one can afford. The genetics must be right and with the evaluation systems, like the veld bull trial, in place it is no longer necessary to guess whether a bull is suitable or not – the information is there for all to see. Beef producers cannot buy a bull because it is “handsome” or “masculine”. A bull with the relevant information is a sound

investment that comes with various guarantees in the form of fertility and health certificates. This information that is provided to assist the buyer to make an informed decision costs money and the seller expects a fair price for the bull. With bulls a bargain often turns into a disaster as a good bull produces numerous offspring in a year and one bad purchase can wipe out years of good work. A guideline I have heard speaks to paying for a good commercial bull what you would get when slaughtering 4 fat cows.

IN CLOSING

- Fertility is the most important element of livestock production. The heritability of fertility is low (±10%) but the repeatability is high (70%+). This means that external factors (environment) play a big role in reproduction. It also means that once an animal has started reproducing it is likely it will continue doing so if the management is stable. It is here where adaptability plays an important role because an animal that is adapted to a harsh environment is then actually in a favourable environment.
- Nutrition is the most important element of the management as it has to provide the animal with the means to fulfil its production function. An adapted animal will reproduce and produce on what is available.
- An adapted animal requires fewer inputs to fulfil its production function – reproduction and growth.
- Where feed is limited it takes an animal longer to satisfy its maintenance requirement. Small frame breeds have lower maintenance requirements and therefore adapt to trying conditions more successfully.
- It is possible to produce slaughter ready class A, AB and B carcasses from an extensive, low input beef production system, thereby exploiting the growth potential of the animal.
- Beef breeds do not differ in the ratios of meat that they produce irrespective of what is often claimed.
- Remain informed about your beef production industry.
- Remain involved with organisations that have your interests at heart because no producer can face the market successfully alone.

Farm with the breed of your choice but be guided by the production environment. While performance-based management is important (reproduction and growth aspects), market oriented management is equally, if not more, important. There is an opportunity for the beef producer to exploit – “organic” beef that has all the traits that the market wants. Take a step back, look at your situation and consider the possibility of producing what the market wants and the Nguni offers you that option!

Remember, an opportunity is NEVER lost – if you don’t take it somebody else does!

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